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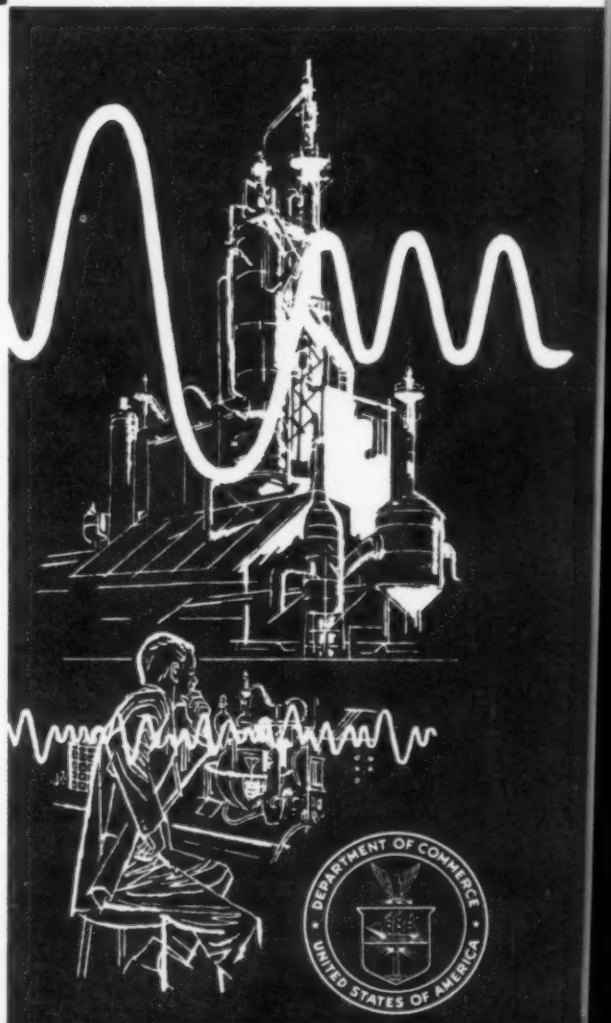

U. S. DEPARTMENT OF COMMERCE
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U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, *Secretary*

OFFICE OF TECHNICAL SERVICES
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*ELECTRONIC CIRCUITS

PROPAGATION CHARACTERISTICS AND IMPEDANCE OF RING-PLANE SLOW-WAVE CIRCUITS FOR USE WITH HIGH-PERVEANCE BEAMS IN TRAVELING-WAVE TUBES CAPABLE OF OPERATION ABOVE 35 KMC.
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*ELECTRONIC CIRCUITS
INVERTER CIRCUITS

TECHNIQUES FOR THE MATHEMATICAL ANALYSIS AND DESIGN OF ELECTRONIC CIRCUITS.
AD-286 178 DIV. 5

*ELECTRONIC EQUIPMENT
SOUND

THE RESPONSE OF ELECTRONIC EQUIPMENT TO INTENSE SOUND FIELDS.
AD-286 862 DIV. 8

*ELECTRONS

RANGE - ENERGY RELATIONSHIPS FOR PROTONS PENETRATING SILICON AND QUARTZ FOR THE REGION 100 KEV TO 100 MEV.
AD-285 855 DIV. 20

STUDY OF ELECTRON DECAY RATES IN THE AFTERGLOW OF A MICROWAVE DISCHARGE IN IODINE VAPOR.
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*ELECTRONS
PRODUCTION

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AD-286 372 DIV. 2

*ELECTRONS
SCATTERING

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*ENERGY

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*ENERGY
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*ENTHALPY

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*ENZYMES

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*ENZYMES
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ACTIVITY OF ACETYL COA CARBOXYLASE IS DEPRESSED IN 24-HOUR FASTING AND MARKEDLY SO BY 72-HOUR FASTING, WHILE THE ACTIVITY OF FATTY ACIDS SYNTHETASE IS NOT SIGNIFICANTLY DEPRESSED IN 24-HOUR FASTING BUT IS DEPRESSED AT THE END OF 72 HOURS. THE RESULT OF LOW RATE OF LIPOGENESIS INITIATED BY OTHER FACTORS: THE DISAPPEARANCE OF LIPOGENESIS STIMULATORS AND THE APPEARANCE OF LIPOGENIC INHIBITORS.
AD286 519 DIV 16

*EPOXY RESINS

GLASS SURFACE CHEMISTRY RELATING TO GLASS FIBER REINFORCED PLASTICS WAS STUDIED. BOND LIFE, MECHANICAL CHANGE IN GLASS SURFACE, GEOMETRY OF AIR BUBBLES, WETTING, AND COUPLING AGENTS WERE INVESTIGATED.
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*EQUATIONS

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AD-286 807 DIV. 2

*ERRORS

A GYROSCOPIC LINEAR ACCELEMOMETER. SYSTEM ERRORS DURING ARBITRARY MOTION OF THE BASE.
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A TECHNIQUE IS PROPOSED FOR THE CONTROL OF ERRORS IN DIGITAL DATA COMMUNICATIONS IN WHICH ERRORS ARE DETECTED WITHIN THE BLOCK OF RECEIVED DIGITS AND FURTHER SPECIFIED TO WITHIN A SUB-BLOCK.
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A NEW UPPER BOUND ON NONSYSTEMATIC BINARY ERROR-CORRECTING CODES, IMPROVED ASYMPTOTIC PROPERTIES OF.
AD-286 756 DIV. 8

THE PROPAGATION OF ERROR IN NUMERICAL INTEGRATION OF THE DISCRETE VORTICITY EQUATION.
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*ERYTHROCYTES
HEMOLYSIS

EXPERIMENTAL DATA AND DISCUSSIONS OF THE MECHANISMS OF ACTION OF PROTECTIVE ADDITIVES, ALTERATIONS OF THE RED BLOOD CELL INDUCED BY FREEZING AND THAWING, AND POSSIBLE MECHANISMS

OF FREEZE-THAW INJURY ARE PRESENTED AS ASPECTS OF AN INVESTIGATION INTO METHODS FOR PRESERVATION OF BLOOD AT LOW TEMPERATURE.
AD-286 731 DIV. 16

BIOPHYSICAL STUDIES ON THE FREEZING OF SUPERCOOLED BLOOD DEMONSTRATE THAT THE RATE AND EXTENT OF ICE CRYSTAL FORMATION ARE THE MAIN FACTORS IN FREEZE-THAW ERYTHROCYTE DAMAGE AND THAT THE PROTECTIVE ACTION OF ADDITIVES MAY BE DUE TO THEIR ABILITY TO BIND WATER.
AD-286 733 DIV. 16

***ERYTHROCYTES**
SURVIVAL

EFFECTS OF PROTECTIVE ADDITIVES SUCH AS GLYCEROL, GLUCOSE, PVP, ETC., RATE OF HEAT TRANSFER TO AND FROM THE BLOOD, ANION CONCENTRATION, ENZYME ACTIVITY, AND DESIGN OF CONTAINERS ON ERYTHROCYTE VIABILITY IN BLOOD PRESERVED BY RAPID FREEZING.
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PROCEDURES ARE DESCRIBED FOR ASSAYING THE IN VIVO VIABILITY OF RABBIT ERYTHROCYTES USING A RADIOACTIVE CHROMIUM LABEL. THE EFFECT OF VARIOUS ADDITIVES, OF FREEZING AND THAWING BY VARIOUS PROCEDURES AND OF THE TEMPERATURE DURING STORAGE ON ERYTHROCYTES VIABILITY.
AD-286 745 DIV. 16

BLOOD CONTAINER DESIGN AND THE CONDITIONS NECESSARY TO OBTAIN HIGH ERYTHROCYTE RECOVERY WITH GLUCOSE AS THE PROTECTIVE ADDITIVE ARE INVESTIGATED IN A STUDY DESIGNED TO PROVIDE APPARATUS AND PROCESSING METHODOLOGY FOR THE EXPERIMENTAL FREEZING AND THAWING OF BLOOD.
AD-286 746 DIV. 16

THE VIABILITY OF HUMAN AND RABBIT ERYTHROCYTES PRESERVED BY RAPID FREEZING AND THAWING WITH GLUCOSE AND LACTOSE-GLUCOSE AS PROTECTIVE ADDITIVES ASSAYED BY PROCEDURES INCLUDING AN INDEPENDENT MEASURE OF BLOOD VOLUME.
AD-286 748 DIV. 16

THE CONSECUTIVE CHROMIUM-51 METHOD FOR TAGGING ERYTHROCYTES TO DETERMINE THEIR IN VIVO SURVIVAL IS DESCRIBED IN DETAIL AND COMPARED TO OTHER METHODS. ITS APPLICATION FOR EVALUATION OF PROCESSING VARIABLES INVOLVED IN LOW TEMPERATURE BLOOD PRESERVATION IS STRESSED.
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FOUR BASIC PROCESSES FOR LOW TEMPERATURE BLOOD PRESERVATION WHICH DIFFER BY WHETHER OR NOT AND TO WHAT DEGREE ERYTHROCYTES ARE SEPARATED FROM THE PLASMA, PVP AS A PROTECTIVE AGENT, EVALUATION AT LABORATORY LEVEL AND IN ANIMAL AND HUMAN TRANSFUSION.
AD-286 754 DIV. 16

***EVAPORATION**

AN EXPERIMENTAL INVESTIGATION OF EVAPORATIVE COOLING OF THE SURFACE OF A POROUS CONE WITH A HIGH-TEMPERATURE GAS FLOW PASSING AROUND IT. USSR SOURCE.
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***EXCITATION**

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***EXHAUST GAS EJECTORS**

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***EXPERIMENTAL DATA**

DATA SMOOTHING TECHNIQUES FOR DIGITAL COMPUTERS USING LINEAR METHODS. ORTHOGONALIZATION OF MATRICES; LINEAR METHOD OF LEAST SQUARES; ORTHOGONAL POLYNOMIALS.
AD-285 969 DIV. 30

***EXPLOSIONS**
ARCTIC REGIONS

AIR-BLAST PHENOMENA IN AN ARCTIC CLIMATE; 40- AND 32-LB TNT SPHERES FIRED AT SCALED BURST HEIGHTS OVER SNOW 100 FT THICK ON GREENLAND ICE CAP; AIR-BLAST PRESSURE-TIME MEASUREMENTS; MACH TRIPLE-POINT LOCI.
AD-286 639 DIV. 22

***EXPLOSIONS**
PHOTOGRAPHIC ANALYSIS

ROTATING-MIRROR SMEAR CAMERA PHOTOGRAPHIC STUDY OF GROWTH OF EXPLOSION IN SILVER AZIDE, LEAD AZIDE, LEAD STYPHNATE, AND PETN WHEN INITIATED BY A NICHROME WIRE.
AD-285 688 DIV. 22

***EXPLOSIONS**
PROPAGATION

GROWTH TO DETONATION OF NORMAL LEAD STYPHNATE-LEAD AZIDE, NORMAL LEAD STYPHNATE-SILVER AZIDE, NORMAL LEAD STYPHNATE-PETN, SILVER AZIDE-PETN, AND NORMAL LEAD STYPHNATE-FLAKE ALUMINUM MIXTURES OBSERVED USING ROTATING-MIRROR SMEAR CAMERAS.
AD-286 501 DIV. 22

***EXPLOSIVE FORMING**

EXPLOSIVE FORMING OF MILD STEEL AND HIGH STRENGTH STEEL IN PRODUCING 36-IN. DIAMETER HEMISPHERICAL DOMES AS CLOSURES FOR LARGE SOLID PROPELLANT MOTOR CASES.
AD-286 252 DIV. 26

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AZIDES

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AD-286 054 DIV. 4

***EXPLOSIVES**
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TRACE ANALYSIS OF ULTRA-PURE EXPLOSIVES; LITERATURE SURVEY; INSTRUMENTAL TECHNIQUES HAVING SENSITIVITIES OF LESS THAN 1 PPM.
AD-286 272 DIV. 22

***EXPLOSIVES**
DETONATION

GROWTH TO DETONATION OF NORMAL LEAD STYPHNATE-LEAD AZIDE, NORMAL LEAD STYPHNATE-SILVER AZIDE, NORMAL LEAD STYPHNATE-PETN, SILVER AZIDE-PETN, AND NORMAL LEAD STYPHNATE-FLAKE ALUMINUM MIXTURES OBSERVED USING ROTATING-MIRROR SMEAR CAMERAS.
AD-286 501 DIV. 22

***EXPOSURE**

SEVENTEEN PAPERS DESCRIBING THE LOGISTICS, STRATEGIC IMPORTANCE, PHYSIOLOGICAL, MEDICAL, AND PSYCHIATRIC PROBLEMS, AND SOCIOLOGICAL AND POLITICAL ASPECTS OF MAN LIVING IN THE ARCTIC ARE PRESENTED.
AD-286 507 DIV. 16

COLD INJURY AND COLD ACCLIMATIZATION IN MAN; ITS POSSIBILITY AS A PROTECTIVE MECHANISM IN COLD INJURY.
AD-286 603 DIV. 16

***EXPOSURE**
HEAT

THE EFFECT OF ACUTE AND CHRONIC OVERHEATING IN HEAT ADAPTED AND NORMAL ANIMALS ON NA AND K BLOOD LEVELS, SERUM PROTEIN FRACTIONS, SOLUBLE LIVER PROTEIN FRACTION, TISSUE DEHYDRATION IN THYROIDECTOMIZED ANIMALS, HEART MUSCLE SUCCINIC DEHYDROGENASE LEVELS, PHAGOCYTE ACTIVITY AND NUMBER IN BLOOD, AND RIBOFLAVIN, FLAVIN MONONUCLEOTIDE, AND FLAVIN-ADENINE DINUCLEOTIDE TISSUE LEVELS.
AD286 570 DIV 16

***EXTRATERRESTRIAL RADIO WAVES**

SUNRISE AND SUNSET EFFECTS ON COSMIC NOISE ASSOCIATED WITH AURORA AND MAGNETIC STORMS.
AD-286 294 DIV. 2

***EXTREMELY HIGH FREQUENCY**

PLASMA ACCELERATION BY A 2.4 KMC GRADIENT ELECTRIC FIELD.
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CYCLOTRON RESONANCE INTERACTION BETWEEN AN ELECTRON BEAM AND A CIRCUIT WAVE TO PRODUCE BACKWARD WAVE OSCILLATION IN AN UNLOADED WAVEGUIDE IN THE S-BAND (MM-WAVELENGTH).
AD-286 326 DIV. 8

***EYE**

VISUAL PERCEPTION MEASUREMENTS UNDER VARIED TIME AND VIEWING CONDITIONS SHOWING RELATIVE MYOPIA.
AD-286 487 DIV. 16

***FACTOR ANALYSIS**

APPLICATIONS OF THE CALCULUS OF FACTORIAL ARRANGEMENTS IN BLOCK AND DIRECT PRODUCT DESIGNS
AD-285 662 DIV. 15

***FAILURE (MECHANICS)**

WEIBULL TABLES FOR BIO-ASSAYING AND FATIGUE TESTING. AN ACCEPTANCE SAMPLING PROCEDURE AND TABLES OF RELATED SAMPLING INSPECTION PLANS FOR THE EVALUATION OF LOT QUALITY IN TERMS OF RELIABLE LIFE (OR ITS COMPLEMENT, QUANTILE LIFE) ARE PRESENTED.
AD-286 035 DIV. 30

A METHOD FOR DETERMINING A CONFIDENCE BOUND ON UNRELIABILITY WHEN TIME-TO-FAILURE IS NORMALLY DISTRIBUTED.
AD-286 302 DIV. 15

***FATIGUE (MECHANICS)**

WEIBULL TABLES FOR BIO-ASSAYING AND FATIGUE TESTING. AN ACCEPTANCE SAMPLING PROCEDURE AND TABLES OF RELATED SAMPLING INSPECTION PLANS FOR THE EVALUATION OF LOT QUALITY IN TERMS OF RELIABLE LIFE (OR ITS COMPLEMENT, QUANTILE LIFE) ARE PRESENTED.
AD-286 035 DIV. 30

STATIC FATIGUE FRACTURE TESTS ON HIGH PRESSURE GAS VESSELS.
AD-286 056 DIV. 17

A FIXTURE WAS DESIGNED AND BUILT FOR AXIAL TENSION-COMPRESSION FATIGUE TESTING. LIMITED TESTING WAS CONDUCTED.
AD-286 284 DIV. 17

THE NOTCHED FATIGUE BEHAVIOR OF 13 ALLOYS WAS STUDIED AT ROOM TEMPERATURE TO -423F AND LIFETIME RANGES FROM 10 TO THE 4TH POWER TO 10 TO THE 9TH POWER CYCLES.
AD-286 480 DIV. 17

TENSILE, STRESS RUPTURE, AND FATIGUE DATA OF HIGH-STRENGTH.
AD-286 832 DIV. 17

***FATIGUE (MECHANICS)**
TEST EQUIPMENT

DEVELOPMENT OF REPETITIVE KILOTON THRUSTS OF MILLISECONDS DURATION FOR SIMULATING THE FIRING AND DETERMINING THE RELIABILITY OF HEAVY-WEAPON COMPONENTS.
AD-286 647 DIV. 30

***FATTY ACIDS**

PHYSIOLOGIC REGULATION OF LIPOGENESIS IS DISCUSSED. THE ACETYL COA CARBOXYLASE STEP IS DESCRIBED AS THE SITE OF REGULATION IN THE ENZYMATIC SEQUENCE OF FATTY ACID SYNTHESIS.
AD-286 514 DIV. 16

ACTIVITY OF ACETYL COA CARBOXYLASE IS DEPRESSED IN 24-HOUR FASTING AND MARKEDLY SO BY 72-HOUR FASTING, WHILE THE ACTIVITY OF FATTY ACIDS SYNTHETASE IS NOT SIGNIFICANTLY DEPRESSED IN 24-HOUR FASTING BUT IS DEPRESSED AT THE END OF 72 HOURS. THE RESULT OF LOW RATE OF LIPOGENESIS INITIATED BY OTHER FACTORS; THE DISAPPEARANCE OF LIPOGENESIS STIMULATORS AND THE APPEARANCE OF LIPOGENIC INHIBITORS.
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***FEATHERS**

PROCEEDINGS OF A CONFERENCE ON THE UTILIZATION OF CHICKEN FEATHERS AS FILLING MATERIALS.
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***FEDERAL SUPPLIES**

AN AUTOMATED PROCEDURE FOR DETERMINING POTENTIAL STANDARDIZATION OF ITEMS WITHIN THE FEDERAL SUPPLY CLASSIFICATION SYSTEM.
AD-286 729 DIV. 26

***FEEDBACK**

STUDY OF ADAPTABLE COMMUNICATIONS SYSTEMS.
AD-286 504 DIV. 5

***FEEDBACK OSCILLATORS**

FACTORS EFFECTING SHORT TERM FREQUENCY STABILITY OF CRYSTAL OSCILLATORS. EXPOSING THE UNDERLYING PHENOMENA PRODUCING SHORT TERM FREQUENCY VARIATIONS.
AD-286 305 DIV. 8

***FEET**
MOTION

CHANGES IN PATELLAR REFLEX TIME UNDER VARIOUS CONDITIONS STUDIED ON 69 SUBJECTS. NEUROMUSCULAR EXCITABILITY OF THE PERONEUS BREVIS MUSCLE AND THE SUPERFICIAL PERONEAL NERVE MEASURED AFTER AN EXHAUSTIVE ERGOCYCLE RIDE. PHYSICAL EXERCISE TO EXHAUSTION AND EXPOSURE TO HEAT AS PROLONGERS OF REFLEX TIME. MILD EXERCISE AND THE TENDENCY TO SHORTER REFLEX TIME.
AD-286 386 DIV. 16

***FERRITES**

GROWTH OF HEXAGONAL FERRITE SINGLE CRYSTALS FOR APPLICATION AT MICROWAVE AND MILLIMETER-WAVE FREQUENCIES; MICROWAVE SPECTROSCOPY.
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***FERROELECTRIC MATERIALS**

STUDY OF THE HIGH-TEMPERATURE STRUCTURES OF NaNbO3 USING X-RAY PHOTOGRAPHY. EFFECT OF

NEUTRON IRRADIATION ON FERROELECTRIC MATERIALS.
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FERROMAGNETIC MATERIALS

THE TEMPERATURE DEPENDENCE OF THE FERROMAGNETIC HALL EFFECT OF POLYCRYSTALLINE GADOLINIUM IS PRESENTED.
AD-286 031 DIV. 25

FERROMAGNETIC MATERIALS
MICROWAVE AMPLIFIERS

TECHNIQUES FOR FERROMAGNETIC PARAMETRIC AMPLIFICATION IN THE MILLIMETER-WAVE FREQUENCY REGION. TRAVELING WAVE PARAMETRIC AMPLIFICATION UTILIZING FERROMAGNETIC PROPAGATION STRUCTURES.
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FERROMAGNETISM

THE ROLE OF RADIATION-INDUCED DEFECTS ON THE FERROMAGNETIC COMPONENT IN HEMATITE BY X-RAY METHODS.
AD-286 442 DIV. 25

FIBERBOARD

THE METHODS COMMONLY USED TO CUT AND DRY VENEER ARE DESCRIBED. THE VENEER INDUSTRY AND ITS PRODUCTS ARE ALSO DISCUSSED.
AD-286 264 DIV. 14

FIBERS

A PROCEDURE FOR DETERMINING THE COMBINATIONS OF BIAXIAL STRESS WHICH CAUSES FAILURE IN CERTAIN TYPES OF FABRICS IS REPORTED.
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EFFECT OF HUMIDITY ON STRENGTH OF EPOXY RINGS REINFORCED WITH MONOFILAMENT E-GLASS FIBERS: TENSILE PROPERTIES.
AD-286 261 DIV. 14

FIBRIN

THE NATURE OF THROMBIN AND FIBRIN AND THE THERMODYNAMICS OF WATER AND HYDROGEN AND HYDROPHOBIC BONDING IN SOLUTIONS OF HYDROCARBONS AND PROTEINS IN AN INVESTIGATION OF THE MECHANISM OF THE THROMBIN-FIBRINOGEN REACTION.
AD-286 267 DIV. 16

FILAMENT WOUND CONSTRUCTION

EFFECT OF HUMIDITY ON STRENGTH OF EPOXY RINGS REINFORCED WITH MONOFILAMENT E-GLASS FIBERS: TENSILE PROPERTIES.
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THE EFFECT OF TENSION DURING CURE ON THE STRENGTH OF GLASS ROVING AND THE EFFECT OF HUMIDITY CYCLING ON THE STRENGTH OF SINGLE UNCOATED E-GLASS FIBERS.
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FILMS

RATES OF DIFFUSION OF WATER AND CHLORIDE IONS THROUGH ORGANIC FILMS. FILMS PREPARED BY MEANS OF A RADIOACTIVE TRACER TECHNIQUE USING TRITIATED WATER.
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FIRE RESISTANT TEXTILES

DEVELOPMENT OF FLAME-RESISTANT FINISH FOR COTTON TEXTILES. REPLACEMENT OF TETHANIS HYDROXYMETHYL PHOSPHONIUM CHLORIDE (THPC) IN THE TRIS-1-AZIRIDINYL PHOSPHINE OXIDE (APO). THPC FLAME-RESISTANT FINISH FOR TEXTILES.
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A STUDY OF THE PROPAGATION OF A FLAME ALONG A PLANE AND CYLINDRICAL SURFACE OF CONTACT OF SOLID INORGANIC OXIDIZING AGENTS INCAPABLE OF BURNING IN THEIR PURE FORM AND SOLID FUELS.
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INVERSE PROBLEMS OF HEAT CONDUCTION OF ASYMMETRIC FIELDS AND HEAT TRANSFER DURING FLUID FLOW IN A PIPE ARE STUDIED.
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SEPARATED LAMINAR FLOW OF A TWO-PHASE MIXTURE IN INCLINED AND HORIZONTAL PIPES.
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AN EXPERIMENTAL INVESTIGATION OF HEAT TRANSFER OF LONGITUDINALLY STREAMLINED PLATE IN A LAMINAR BOUNDARY LAYER IS DESCRIBED.
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PURE FLUID AMPLIFICATION STUDY FOR DESIGN AND DEVELOPMENT OF FLUID AMPLIFIERS: BOTH BISTABLE AND PROPORTIONAL: WITH NO MOVING PARTS.
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FLUID FLOW
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EXPERIMENTAL STUDY OF THE 3 DIMENSIONALITY OF THE FLOW AROUND A CIRCULAR CYLINDER.
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FLUID FLOW
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FLUID MECHANICS

VORTICES DOWNSTREAM OF AN INFINITELY LONG THIN FLAT PLATE INCLINED AT INCIDENCES BELOW 90 DEGREES ARE INVESTIGATED.
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FLUID MECHANICS
AMPLIFIERS

PURE FLUID AMPLIFICATION STUDY FOR DESIGN AND DEVELOPMENT OF FLUID AMPLIFIERS: BOTH BISTABLE AND PROPORTIONAL: WITH NO MOVING PARTS.
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FLUID MECHANICS
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THEORETICAL RESEARCH IN THE STATISTICAL MECHANICS OF PHYSICS PROCESSES.
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FLUIDS
STABILITY

TRIARYL PHOSPHATE ESTER (TAP) FLUIDS WERE EXPOSED AT 200 TO 300 F TO AIR OF VARIOUS RELATIVE HUMIDITIES. HYDROLYSIS: OXIDATION: DEGRADATION: AND STABILITY TESTS: IGNITION TEMPERATURES.
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FLUORIDES
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ELECTROLYSES OF SYSTEMS CONTAINING HF WITH NH3 AND WITH NITROGEN OXIDES. NH3 SYNTHESIZED ELECTROCHEMICALLY. ELECTRODE REACTIONS OF THE HF-NO SYSTEM WHICH CONFIRM A PREVIOUSLY PROPOSED MECHANISM FOR ANODIC OXIDATION.
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FLYING PLATFORMS

STATIC STABILITY IN PITCH: ROLL: AND YAW OF A GENERALIZED ANNULAR JET GEM IN HOVER AND FORWARD FLIGHT AT RATIOS OF HEIGHT/DIAMETER EXCEEDING 0.1. EFFECTS OF MODEL MODIFICATIONS: CONTROL FORCES: PERFORMANCE AND PRESSURE DISTRIBUTION DATA.
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FOILS

DEVELOPMENT OF MANUFACTURING METHODS AND DESIGN OF LIGHTWEIGHT METAL FOIL HEAT EXCHANGERS.
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PREPARATION OF HIGH PURITY BE BY ZONE MELTING AND THE STUDY OF ITS DEFORMATION AND FRACTURE CHARACTERISTICS.
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ELECTRODE PROCESSES FOR OXIDATION OF LOW MOL WT ORGANIC COMPOUNDS AT PT ELECTRODES IN 2N H2SO4 AND 2N NAOH SOLUTIONS. NEW METHOD FOR OBSERVING ORDER OF ELECTRODE REACTIONS. CYCLIC VOLTAMMETRY, CHRONOPOTENTIOMETRY, POTENTIAL DECAY, AND CONTROLLED POTENTIAL OXIDATION WERE USED.
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EFFECT OF OXIDATION ON GREASE LUBRICITY. AN OXIDIZED GREASE DISPLAYS GREATER WEAR THAN UNOXIDIZED GREASE; MAXIMUM WEAR INCREASE OCCURS AT THE TEMPERATURE AT WHICH THE GREASE IS OXIDIZED; BOTH SOAP AND OIL TYPE AFFECT OXIDATION STABILITY AND WEAR.
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ASCORBIC ACID

TO TEST THE HYPOTHESIS THAT THE RAPID OXIDATION OF ASCORBIC ACID TO ITS TOXIC DERIVATIVE DEHYDROASCORBIC ACID MAY BE RESPONSIBLE FOR RADIOBIOLOGICAL DAMAGE, BLOOD AND TISSUE LEVELS OF ASCORBIC, DEHYDROASCORBIC, AND DIKETOGULONIC ACID WERE DETERMINED FOLLOWING EXPOSURE TO X-RAYS.
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ELECTROLYSES OF SYSTEMS CONTAINING HF WITH NH3 AND WITH NITROGEN OXIDES. NH3 SYNTHESIZED ELECTROCHEMICALLY. ELECTRODE REACTIONS OF THE HF-NO SYSTEM WHICH CONFIRM A PREVIOUSLY PROPOSED MECHANISM FOR ANODIC OXIDATION.
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***OXYGEN**
COMBUSTION

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***OXYGEN**
LOW PRESSURE RESEARCH

VARIABLES AFFECTING CRYOTRAPPING OF ME AND H DURING 20 K CONDENSATION OF O AND NF MECHANISM AND CONDENSATION RATES APPLICABLE FOR ME AND H REMOVAL IN A LARGE SPACE CHAMBER.
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***OXYGEN**
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THERMODYNAMICS OF INTERSTITIAL SOLID SOLUTIONS AND NONSTOICHIOMETRIC COMPOUNDS APPLIED TO TI-O SYSTEM TO EVALUATE THE CONTRIBUTION OF POSITIONAL AND VIBRATIONAL ENTROPY; ZERO POINT ENTHALPY AND FREE ENERGY.
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***OXYGEN COMPOUNDS**

ELECTROLYSES OF SYSTEMS CONTAINING HF WITH NH3 AND WITH NITROGEN OXIDES. NH3 SYNTHESIZED ELECTROCHEMICALLY. ELECTRODE REACTIONS OF THE HF-NO SYSTEM WHICH CONFIRM A PREVIOUSLY PROPOSED MECHANISM FOR ANODIC OXIDATION.
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***OXYGEN ELECTRODES**

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SATELLITE MEASUREMENT PROGRAM TO DETERMINE OZONE CONCENTRATION AND ALBEDO IN THE NEAR ULTRAVIOLET.
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AIR DROP OPERATIONS

COLD-WATER-SOLUBLE HONEYCOMB FACING ADHESIVE FOR FIELD USE. AN AMYLOPECTIN STARCH, HAMALING, WAS THE MOST SATISFACTORY DRY FACING ADHESIVE EVALUATED. THE PRIMARY PURPOSE OF THE PROGRAM WAS TO DEVELOP A DRY ADHESIVE WITH LONG STORAGE LIFE, READILY DISPERSED IN COLD WATER AND APPLICABLE TO THE BONDING OF KRAFT FACING PAPER TO PAPER HONEYCOMB CORE ON FIELD EQUIPMENT.
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***PAIN**

THE EFFECT OF CENTRAL NERVOUS SYSTEM STIMULANT DRUGS, ULTRA HIGH FREQUENCY FIELDS, SKIN PAIN, SOUND, VESTIBULAR POSTROTATIONAL REACTIONS, AND SECONDARY LIGHT STIMULI ON VISUAL AFTERIMAGES WAS STUDIED.
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CHROMATE LEACHING UNDER ACCELERATED WEATHERING CONDITIONS. PREPARATION OF CHROMIUM 51 TAGGED ZNCRO4 PIGMENT FOR USE IN LACQUER VEHICLE PRIMER, AND A PROPRIETARY CACRO4 PIGMENT FOR USE IN EPOXY RESIN VEHICLE PRIMER. RADIOACTIVE COUNTS DETERMINED CHROMATE LOSSES; AND WT. DIFFERENCES DETERMINED PRIMER LOSSES UNDER WEATHERING CONDITIONS.
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GALLIUM ARSENIDE SOLAR CELL PRODUCTION PROCESSES AND TECHNIQUES. FABRICATION PROCESSES DEVELOPED UNDER CONTRACT NAS5-457 AND PRESENTLY IN USE FOR CONTRACT AF33(657)-8490 WERE ADOPTED. THE PRESENT PROCESSES REFLECT SOME IMPROVEMENTS OVER PREVIOUS ONES. AN EXAMPLE IS THE USE OF SINGLE CRYSTAL GAAS GROWN IN THE 111 DIRECTION WHICH ALLOWS CONSIDERABLE SAVINGS IN GAAS AS THE WAFERS ARE ONLY SLIGHTLY LARGER THEN REQUIRED
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A PUBLICATION LIST OF WORK DONE IN THE FIELD OF THEORETICAL PHYSICS OF ELEMENTARY PARTICLES.
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***PHYSICS**
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P. N. LEBEDEV AND THE LATEST PROBLEMS OF MODERN PHYSICS.
AD-285 837 DIV. 25

***PHYSIOLOGY**

THE EFFECT OF ACUTE AND CHRONIC OVERHEATING IN HEAT ADAPTED AND NORMAL ANIMALS ON NA AND K BLOOD LEVELS; SERUM PROTEIN FRACTIONS; SOLUBLE LIVER PROTEIN FRACTION; TISSUE DEHYDRATION IN THYROIDECTOMIZED ANIMALS; HEART MUSCLE SUCCINIC DEHYDROGENASE LEVELS; PHAGOCYTE ACTIVITY AND NUMBER IN BLOOD; AND RIBOFLAVIN, FLAVIN MONONUCLEOTIDE, AND FLAVIN-ADENINE DINUCLEOTIDE TISSUE LEVELS.
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***PHYSIOLOGY**
ARCTIC REGIONS

SEVENTEEN PAPERS DESCRIBING THE LOGISTICS, STRATEGIC IMPORTANCE, PHYSIOLOGICAL, MEDICAL, AND PSYCHIATRIC PROBLEMS, AND SOCIOLOGICAL AND POLITICAL ASPECTS OF MAN LIVING IN THE ARCTIC ARE PRESENTED.
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CHROMATE LEACHING UNDER ACCELERATED WEATHERING CONDITIONS. PREPARATION OF CHROMIUM 51 TAGGED ZNCRO4 PIGMENT FOR USE IN LACQUER VEHICLE PRIMER, AND A PROPRIETARY CACRO4 PIGMENT FOR USE IN EPOXY RESIN VEHICLE PRIMER. RADIOACTIVE COUNTS DETERMINED CHROMATE LOSSES, AND #T. DIFFERENCES DETERMINED PRIMER LOSSES UNDER WEATHERING CONDITIONS.
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DETERMINATION OF THE HEAT-TRANSFER COEFFICIENTS IN SUPERSONIC TUBE FLOWS OF A RAREFIED GAS. USSR SOURCE.
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***PISTONS**

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MUTUAL IMPEDANCE OF PISTONS, STRIPS AND RINGS ON AN INFINITELY LONG RIGID CYLINDRICAL BAFFLE. BASIC INTEGRALS AND CALCULATIONS.
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*PLANETS
OPTICAL ANALYSIS

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AD-285 999 DIV. 2

*PLANTS

A RIVAL OF GINSENG, ECHINOPANAX, EPHEDRA AND OTHER PLANTS WERE DISCOVERED. POSITIVE STIMULATING EFFECTS RESULT FROM THE EXTRACT OF ELEUTHEROCOCCUS, PROPHYLACTIC AND THERAPEUTIC POWERS.
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*PLASMA JETS

MAGNETOHYDRODYNAMICS AND ENERGY CONVERSION. AN ELECTRODYNAMIC AMPLIFIER FOR A LOW-CONDUCTIVITY PLASMA.
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PLASMA ACCELERATION BY A 2.4 KMC GRADIENT ELECTRIC FIELD.
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SPECTROGRAPHICALLY DETERMINED PLASMA JET TEMPERATURES.
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ELECTRIC ARC PHENOMENA AND PLASMA JET DEVICES. LITERATURE SUMMARY.
AD-286 366 DIV. 25

THE TEMPERATURE DISTRIBUTION IN A 12-KW ARGON PLASMA JET.
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*PLASMA PHYSICS

MAGNETOHYDRODYNAMICS AND ENERGY CONVERSION. AN ELECTRODYNAMIC AMPLIFIER FOR A LOW-CONDUCTIVITY PLASMA.
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PLASMA ACCELERATION BY A 2.4 KMC GRADIENT ELECTRIC FIELD.
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AD-286 046 DIV. 25

SPECTROGRAPHICALLY DETERMINED PLASMA JET TEMPERATURES.
AD-286 053 DIV. 25

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*PLASMA PHYSICS
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*PLASTIC FLOW

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*PLASTIC PAINTS

CHROMATE LEACHING UNDER ACCELERATED WEATHERING CONDITIONS. PREPARATION OF CHROMIUM 51 TAGGED ZNCRO4 PIGMENT FOR USE IN LACQUER VEHICLE PRIMER AND A PROPRIETARY CACRO4 PIGMENT FOR USE IN EPOXY RESIN VEHICLE PRIMER. RADIOACTIVE COUNTS DETERMINED CHROMATE LOSSES AND AT DIFFERENCES DETERMINED PRIMER LOSSES UNDER WEATHERING CONDITIONS.
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*PLASTICITY

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*PLASTICS

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AD-286 116 DIV. 14

*PLASTICS
HANDBOOKS

SHORT HANDBOOK OF TECHNOLOGY AND MACHINE BUILDING. CONTAINS TABLES DEALING WITH MATERIAL (METALS, PLASTICS, RESINS, ADHESIVES, WOOD PULP, PLYWOOD, ETC.) PROPERTIES, WELDING, MANUFACTURING AND MACHINING METHODS.
AD-286 590 DIV. 26

*PLASTICS
LAMINATES

GLASS CLOTH REINFORCED PLASTICS. ROOM AND ELEVATED TEMPERATURE TESTS TO ESTABLISH DESIGN ALLOWABLES FOR GLASS-CLOTH REINFORCED PLASTICS. THE CLOTHS ARE DESIGNATED AS 181, 143, 120, AND 183; THEY WERE COMBINED WITH THE FOLLOWING RESINS: LAMINAC 4232, CONOLON 506 AND EPON 828.
AD-286 329 DIV. 14

*PLASTICS
MECHANICAL PROPERTIES

SUMMARY OF QUALIFICATION TEST DATA ON FABRICATION AND MECHANICAL PROPERTIES OF GLASS REINFORCED EPOXY, PHENOLIC, AND POLYESTER RESIN MATERIALS.
AD-286 330 DIV. 14

*PLASTICS
THERMODYNAMICS

FUNDAMENTAL THERMODYNAMIC PROPERTIES OF POLYMETHYL METHACRYLATE AND METHYL METHACRYLATE INCLUDED SPECIFIC HEAT, ENTROPY, ENTHALPY AND GIBBS FREE ENERGY DATA.
AD-286 502 DIV. 14

*PLYWOOD

MARINE LAMINATING PROPERTIES OF SELECTED WOOD SPECIES. WEATHERING EXPOSURE EVALUATIONS WERE MADE PERIODICALLY UP TO 2 YEARS ON A SERIES OF DOMESTIC, FOREIGN AND TREATED WOOD LAMINATES. FIFTY OF 79 SPECIMENS SHOWED SATISFACTORY QUALITIES. IN GENERAL, VERY HIGH DENSITY SPECIES WERE UNSATISFACTORY WHEN LAMINATED UNDER CONDITIONS SUITABLE FOR WHITE OAK HEARTWOOD.
AD-285 861 DIV. 14

THE METHODS COMMONLY USED TO CUT AND DRY VENEER ARE DESCRIBED. THE VENEER INDUSTRY AND ITS PRODUCTS ARE ALSO DISCUSSED.
AD-286 264 DIV. 14

*PNEUMATIC SYSTEMS
FLUID FLOW

METHOD USED IN FLOW VISUALIZATION AND THEIR APPLICATION TO PURE FLUID SYSTEMS.
AD-286 606 DIV. 9

*POLARIZATION

POLARIZATION CAPACITANCE IS UTILIZED IN DETERMINING THE SURFACE PROPERTIES OF METALS, WITH EMPHASIS ON SURFACE ROUGHNESS FACTORS; MEASUREMENTS ON AU AND PT ELECTRODES.
AD-286 429 DIV. 4

*POLYMER SOLUTIONS
DYES

ABSORPTION OF THE DYE, THIONINE, IN ULTRAVIOLET AND VISIBLE RANGE. FORMATION OF DIMERS, TRIMERS, AND POLYMERS IN SOLUTIONS OF CHLORIDES AND SULFATES.
AD-286 870 DIV. 4

*POLYMERS

THE SYNTHESIS AND PROPERTIES OF BIOLOGICALLY ACCEPTABLE TERPOLYMERS AND THEIR USE IN THE PREPARATION OF ARTIFICIAL ARTERIES AND CARTILAGINOUS REPLACEMENTS FOR FEMORAL HEADS ARE PRESENTED.
AD-286 055 DIV. 16

*POLYMERS
BONDING

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AD-286 704 DIV. 14

*POLYMERS
SYNTHESIS

SYNTHESIS OF ELASTOMERS BY THE REACTION OF CYCLIC OR LINEAR SILAZANE COMPOUNDS WITH DIOLS. PREPARATION OF N-TRIMETHYLSILYLHEXAMETHYLCYCLOTRISILAZANE.
AD-286 279 DIV. 14

HIGH-TEMPERATURE-STABLE INORGANIC RESINS AND ELASTOMERS. PREPARATION OF ELASTIC SILICATES WAS INVESTIGATED. ATTEMPTS WERE MADE TO MODIFY NATURAL SILICATES, ASBESTOS AND MICA, AND TO SYNTHESIZE SILICATE POLYMERS. SILICATE-SILANE POLYMERS ARE DISCUSSED.
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*POLYMERS
THERMODYNAMICS

FUNDAMENTAL THERMODYNAMIC PROPERTIES OF POLYMETHYL METHACRYLATE AND METHYL METHACRYLATE INCLUDED SPECIFIC HEAT, ENTROPY, ENTHALPY AND GIBBS FREE ENERGY DATA.
AD-286 502 DIV. 14

*PORTABLE SHELTERS

A DOUBLE-WALL, TUBULAR-CELL, AIR-SUPPORTED TENT FOR USE AS AN ORGANIZATIONAL MAINTENANCE SHELTER FOR THE HU-1 HELICOPTER AND AIRCRAFT OF SIMILAR SIZE.
AD-286 008 DIV. 1

*POSITION FINDING
ERRORS

ERROR FIELD ASSOCIATED WITH INSTRUMENTATION FOR POSITION DETERMINATION IN ASTRONOMY AND GEODESY.
AD-286 057 DIV. 15

*POSITRONS

DETERMINATION OF MEAN LONG AND SHORT LIVES OF POSITRONS IN ALUMINUM, TIN, COPPER, TITANIUM, AND ZINC. LONG LIVED POSITRONS ARE 5-10% OF TOTAL AND HAVE A MEAN LIFE OF ABOUT 4 X 10 TO THE MINUS 10 SECONDS.
AD-286 667 DIV. 25

*POTASSIUM COMPOUNDS

ENTHALPY AND HEAT OF FUSION VALUES FOR LI, NA, K, CARBONATES AND THE TERNARY EUTECTIC MIXTURE AT 25 AND 275 TO 975 C; SPECIFIC HEATS, ENTROPIES, AND THERMODYNAMIC RELATIONS.
AD-285 649 DIV. 4

LUMINESCENCE AND ELECTRON EMISSION OF ULTRAVIOLET IRRADIATED AND NON-IRRADIATED POTASSIUM AND SODIUM AZIDE BETWEEN 196 C AND 400 C.
AD-286 040 DIV. 25

*POWDER ALLOYS

POWDER METALLURGY TECHNIQUES WERE DEVELOPED FOR MELTING AND ATOMIZATION OF INCO 713C. ARGON GAS WAS EMPLOYED FOR ATOMIZATION. RELATIONS BETWEEN ATOMIZATION PRESSURES, MELT TEMPERATURE AND POWDER CHARACTERISTICS WERE ESTABLISHED. POWDERS PRODUCED WERE FINE, HAD GOOD FLOW CHARACTERISTICS AND LOW INTERSTITIALS.
AD-286 469 DIV. 17

POWDER METALLURGY AND STRENGTH OF MATERIALS; SUBJECTS COVERED INCLUDE: MODULUS OF ELASTICITY OF ALLOYS, WETTABILITY, ELECTRON MICROSCOPE STUDIES OF BREAK SURFACES, PRESSABILITY OF IRON POWDERS.
AD-286 595 DIV. 17

*POWDER METALLURGY

POWDER METALLURGY TECHNIQUES WERE DEVELOPED FOR MELTING AND ATOMIZATION OF INCO 713C. ARGON GAS WAS EMPLOYED FOR ATOMIZATION. RELATIONS BETWEEN ATOMIZATION PRESSURES, MELT TEMPERATURE AND POWDER CHARACTERISTICS WERE ESTABLISHED. POWDERS PRODUCED WERE FINE, HAD GOOD FLOW CHARACTERISTICS AND LOW INTERSTITIALS.
AD-286 469 DIV. 17

POWDER METALLURGY AND STRENGTH OF MATERIALS; SUBJECTS COVERED INCLUDE: MODULUS OF ELASTICITY OF ALLOYS, WETTABILITY, ELECTRON MICROSCOPE STUDIES OF BREAK SURFACES, PRESSABILITY OF IRON POWDERS.
AD-286 595 DIV. 17

***POWDER METALS**

POWDER METALLURGY AND STRENGTH OF MATERIALS; SUBJECTS COVERED INCLUDE: MODULUS OF ELASTICITY OF ALLOYS; WETTABILITY; ELECTRON MICROSCOPE STUDIES OF BREAK SURFACES; PRESSABILITY OF IRON POWDERS.
AD-286 595 DIV. 17

***POWER SUPPLIES**

METHODS OF CONVERTING VARIOUS FORMS OF ENERGY, INCLUDING SOLAR ENERGY, INTO ELECTRICAL ENERGY.
AD-286 578 DIV. 7

HIGH TEMPERATURE VAPOR-FILLED THERMIONIC CONVERTER USING A URANIUM-ZIRCONIUM-CARBIDE EMITTER AND A HIGH TEMPERATURE NICKEL COLLECTOR.
AD-286 700 DIV. 7

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ELECTROLYTIC CELLS

DESIGN AND DEVELOPMENT OF A LIQUID METAL CELL. THE ELECTROCHEMICAL FEASIBILITY AND REGENERATIVE CAPABILITY OF A POTASSIUM-MERCURY LIQUID METAL CELL WAS PROVED. CONDUCTIVITY MEASUREMENTS FOR THE SIX-MICRON (AVERAGE) PARTICLE SIZE COMPOSITE MATRIX WERE COMPLETED.
AD-285 948 DIV. 7

***POWER SUPPLIES**
SATELLITE VEHICLES

NEW CATHODE-ANODE COUPLES USING NONAQUEOUS ELECTROLYTES; POWER SOURCES FOR ORBITING SATELLITES; SECONDARY BATTERIES; ELECTRODE REACTIONS; LI ANODE; AGCL AND NICL2 CATHODES; ELECTRICAL CONDUCTIVITY MEASUREMENTS.
AD-286 889 DIV. 7

***POWER SUPPLIES**
SOLAR CELLS

GALLIUM ARSENIDE SOLAR CELL PRODUCTION PROCESSES AND TECHNIQUES. FABRICATION PROCESSES DEVELOPED UNDER CONTRACT NAS5-457 AND PRESENTLY IN USE FOR CONTRACT AF33(657)-8490 WERE ADOPTED. THE PRESENT PROCESSES REFLECT SOME IMPROVEMENTS OVER PREVIOUS ONES. AN EXAMPLE IS THE USE OF SINGLE CRYSTAL GAAS GROWN IN THE 111 DIRECTION WHICH ALLOWS CONSIDERABLE SAVINGS IN GAAS AS THE WAFERS ARE ONLY SLIGHTLY LARGER

***POWER SUPPLIES**
STORAGE BATTERIES

RADIO (SELECTED ARTICLES). RESTORATION OF STORAGE BATTERIES; SMALL SIZE HERMETICALLY SEALED BATTERIES.
AD-286 135 DIV. 7

***PRACTICE BOMB SIGNALS**
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AD-286 737 DIV. 2

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NEAR FIELD SOUND PRESSURE ON SQUARE AND RECTANGULAR PISTONS. MATHEMATICAL TABLES FOR COMPUTATION.
AD-285 963 DIV. 25

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STATIC FATIGUE FRACTURE TESTS ON HIGH PRESSURE GAS VESSELS.
AD-286 056 DIV. 17

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THE IMPORTANCE OF PROVIDING IDIOPHYLAXIS, BUILT-IN INDIVIDUAL SELF-PROTECTION AGAINST DISEASE, MENTAL STRESSES, UNFAVORABLE CLIMATE FACTORS, RADIATION EFFECTS, INSECTS, FATIGUE, ETC., FOR COMBAT SOLDIERS IS DISCUSSED.
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***PRINTED CIRCUITS**

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PERCENTAGE POINTS OF THE RATIO OF 2 RANGES AND RELATED TABLES.
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***PROGRAMMING**

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AD-285 647 DIV. 30

A SYSTEM FOR TIME-SHARING A PDP-1 DIGITAL COMPUTER WITH SEVEN TYPEWRITERS, TWO PAPER TAPE PUNCHES, TWO PAPER TAPE READERS, AND TWO CRT DISPLAYS.
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INITIAL ORBIT DETERMINATION FROM INDEPENDENT OBSERVATION OF SATELLITE POSITION.
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AN ALGORITHM (WHICH HAS BEEN PROGRAMMED) FOR ASSIGNING CODES TO THE STATES OF A CLOCKED SEQUENTIAL CIRCUIT IN A MANNER THAT PERMITS THE CIRCUIT TO BE EFFICIENTLY REALIZED.
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***PROPAGATION**

LABORATORY TESTS OF SELECTED GRANULAR MATERIALS TO DETERMINE THE VELOCITIES OF PROPAGATION OF THE SHEAR AND COMPRESSION WAVES AND TO EVALUATE THE INTERNAL DAMPING.
AD-286 079 DIV. 25

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AD-286 111 DIV. 8

AN INVESTIGATION OF ANOMOLOUS TRANSMURIZON RADIO WAVE PROPAGATION OVER IRREGULAR TERRAIN. ROCHESTER TO ITHACA, NEW YORK.
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GUIDED COMPLEX WAVES; FIELDS AT AN INTERFACE. PARTICULAR STRESS ON THE STEEPEST DESCENT REPRESENTATION.
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AD-286 377 DIV. 8

A GENERALIZED THEORY OF COUPLED MODES OF PROPAGATION IS APPLIED TO THE STUDY OF INTERACTIONS IN DISTRIBUTED MICROWAVE DEVICES.
AD-286 684 DIV. 8

***PROPELLANT GRAINS**

STUDY OF INTERNAL DISPLACEMENTS IN SOLID PROPELLANT GRAIN MODELS USING AN X-RAY DETECTION SYSTEM AND THE EMBEDDED PARTICLE TECHNIQUE.
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***PROPELLANT GRAINS**
PHOTOELASTICITY

EVALUATION OF TOLYLENE DI-ISOCYANATE AS A COMPARATIVE PHOTOELASTIC MATERIAL FOR THE STUDY OF INTERNAL DISPLACEMENTS IN SOLID PROPELLANT GRAINS.
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***PROPELLANT GRAINS**
STRESSES

STUDIES OF INTERNAL DISPLACEMENTS IN SOLID PROPELLANT GRAINS. PROCEDURE IS DESCRIBED FOR OBTAINING EXPERIMENTAL ERROR ESTIMATES ASSOCIATED WITH X-RAY DETECTION - EMBEDDED PARTICLE TECHNIQUE FOR MEASURING INTERNAL DISPLACEMENTS IN SOLID PROPELLANT GRAINS.
AD-286 560 DIV. 10

***PROPYL ETHERS**

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THE SYNTHESIS AND PROPERTIES OF BIOLOGICALLY ACCEPTABLE TERPOLYMERS AND THEIR USE IN THE PREPARATION OF ARTIFICIAL ARTERIES AND CARTILAGINOUS REPLACEMENTS FOR FEMORAL HEADS ARE PRESENTED.
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***PROTECTIVE CLOTHING**
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***PROTEINS**

THE OCCURRENCE OF A COLD PRECIPITANT PROTEIN (CRYOGLOBULIN) IN THE BLOOD SERA OF A PATIENT WITH MULTIPLE MYELOMA; PAPER STRIP ELECTROPHORETIC (PSE) METHOD APPLIED FOR THE ANALYSIS OF SERUM SPECIMENS; COMPARISON OF GLYCOPROTEIN LEVELS OF CRYOGLOBULIN WITH THOSE CALCULATED FROM THE TOTAL PROTEIN DETERMINATION; ELECTROPHORETIC AND VOLUMETRIC TECHNIQUES.
AD-286 755 DIV. 16

***PROTONS**

RANGE - ENERGY RELATIONSHIPS FOR PROTONS PENETRATING SILICON AND QUARTZ FOR THE REGION 100 KEV TO 100 MEV.
AD-285 855 DIV. 20

***PSYCHOLOGY**

AN AUTOMATED PSYCHOLOGICAL LABORATORY USING A SMALL, EXPANDABLE DIGITAL COMPUTER. STIMULUS PREPARATION; SUBJECT RUNNING; DATA ANALYSIS; EXPERIMENTAL DESIGN; DATA PRESENTATION; AND SUBJECT PREPARATION.
AD-285 610 DIV. 28

***PSYCHOLOGY**
ARCTIC REGIONS

SEVENTEEN PAPERS DESCRIBING THE LOGISTICS, STRATEGIC IMPORTANCE, PHYSIOLOGICAL, MEDICAL, AND PSYCHIATRIC PROBLEMS, AND SOCIOLOGICAL AND POLITICAL ASPECTS OF MAN LIVING IN THE ARCTIC ARE PRESENTED.
AD-286 507 DIV. 16

***PSYCHOMETRICS**

A SCALE ANALYSIS OF GROUP TASKS. THE THURSTONE PROCEDURE FOR THE ANALYSIS OF GROUPS TASKS. IDENTIFICATION OF TEN A PRIORI TASK DIMENSIONS, SORTING OF 100 TASKS INTO 8 CATEGORIES ON EACH OF THE 10 A PRIORI DIMENSIONS.
AD-286 172 DIV. 28

***PSYCHOMETRICS**
BIBLIOGRAPHY

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AD-285 809 DIV. 23

***PUBLIC ADDRESS SYSTEMS**

HIGH POWERED VOICE AMPLIFIER FOR PSYCHOLOGICAL WARFARE USE UNDER DESERT AND HOT WEATHER CONDITIONS.
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***PULSE GENERATORS**

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THE GENERATION, SHAPING AND CONTROL OF HIGH-POWER ELECTRIC PULSES.
AD-286 791 DIV. 8

***PULSE HEIGHT ANALYZERS**

A QUALITY-CONTROL TECHNIQUE FOR MAINTAINING THE INSTRUMENT STABILITY OF A GAMMA-RAY SCINTILLATION SPECTROMETER FOR EXTENDED PERIODS OF TIME.
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***PULSE MODULATION**

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***PYRIDINES**

GAMMA IRRADIATION OF PYRIDINE PRODUCED NEGLIGIBLE GAS YIELDS, BUT MEASURABLE NON-GASEOUS PRODUCTS: DIPYRIDINES, IDENTIFIED BY GAS CHROMATOGRAPHY AND UV ABSORPTION SPECTROSCOPY; AND AN UNIDENTIFIED PRODUCT. A RADIOLYSIS MECHANISM BASED UPON THE FORMATION OF FREE RADICALS IS PRESENTED.
AD-286 058 DIV. 4

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***QUALITY CONTROL**

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AD-286 302 DIV. 15

X CHART CONTROL LIMITS BASED ON A SMALL NUMBER OF SUBGROUPS FOR USE IN STATISTICAL QUALITY CONTROL PROCESSES.
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A QUALITY-CONTROL TECHNIQUE FOR MAINTAINING THE INSTRUMENT STABILITY OF A GAMMA-RAY SCINTILLATION SPECTROMETER FOR EXTENDED PERIODS OF TIME.
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***QUANTUM MECHANICS**

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***QUARTZ CRYSTALS**

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EXPERIMENTS ARE DISCUSSED WHICH SUPPORT THE BEILBY LAYER THEORY (AN AMORPHOUS SUPERFICIAL STRUCTURE PRODUCED ON THE SURFACE OF A MATERIAL BY PLASTIC FLOW DEVELOPED DURING POLISHING OPERATION).
AD-286 525 DIV. 25

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***QUARTZ RESONATORS**

THEORETICAL AND EXPERIMENTAL INVESTIGATIONS TO DETERMINE THE FACTORS THAT LIMIT THE REDUCTION IN SIZE OF AT CUT QUARTZ CRYSTAL RESONATORS.
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***RADAR BEACONS**
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***RADAR DECOYS**
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***RADAR ECHO AREAS**

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***RADAR EQUIPMENT**

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***RADAR JAMMING**
AIRBORNE

JAMMER EVALUATOR ORC-184(T).
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***RADAR NAVIGATION**

A SPECIAL LOW FREQUENCY ANTENNA FOR USE WITH RADIO COMPASS OR LORAN NAVIGATION SYSTEMS FOR USE IN HIGH PERFORMANCE AIRCRAFT.
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EVALUATION OF TRANSPONDER SET AN/UPN-65 (XE-1): A MINIATURE, PULSE-TYPE, C BAND RADAR BEACON DESIGNED FOR USE IN THE TYPHON AND OTHER GUIDED MISSILES AND IN MANNED AND UNMANNED AIRCRAFT TO IMPROVE RADAR TRACKING AT EXTENDED RANGES.
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***RADAR NAVIGATION**
CORRECTIONS

CHARTS OF CORRECTIONS TO AIRBORNE RADAR OBSERVATIONS FOR REFRACTION BY TERRESTRIAL ATMOSPHERES.
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***RADAR REFLECTIONS**
AIRCRAFT

ECHO VARIABILITY AND THE FORMULATION OF A RADAR THEORY; FABRICATION OF A MATHEMATICAL MODEL.
AD-286 670 DIV. 8

***RADAR SIGNALS**
REFLECTION

DOPLOC (DOPPLER PHASE LOCK) DARK; I.E.; NONRADIATING; SATELLITE-TRACKING SYSTEM; RADIO-REFLECTION DOPPLER TRACKING; METHOD DEVELOPED FOR DETERMINATION OF COMPLETE SET OF ORBITAL PARAMETERS FROM DOPPLER DATA FROM SINGLE PASS OF A SATELLITE.
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***RADAR STATIONS**
CLIMATIC FACTORS

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***RADAR TRANSMITTERS**
S BAND

JAMMER EVALUATOR ORC-184(T).
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***RADIATION COUNTERS**
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***RADIATION COUNTERS**
PRODUCTION

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GAMMA IRRADIATION OF PYRIDINE PRODUCED NEGLIGIBLE GAS YIELDS, BUT MEASURABLE NON-GASEOUS PRODUCTS: DIPYRIDINES, IDENTIFIED BY GAS CHROMATOGRAPHY AND UV ABSORPTION SPECTROSCOPY; AND AN UNIDENTIFIED PRODUCT. A RADIOLYSIS MECHANISM BASED UPON THE FORMATION OF FREE RADICALS IS PRESENTED.
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PROPYL GALLATE STIMULATES NUCLEIC ACID METABOLISM IN IRRADIATED RATS, RESTORING THE NORMAL NUCLEIC ACID LEVEL MORE QUICKLY AND MORE COMPLETELY. ITS PROTECTIVE ACTION IN ACUTE RADIATION SICKNESS IS RELATED TO THIS EFFECT.
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TO TEST THE HYPOTHESIS THAT THE RAPID OXIDATION OF ASCORBIC ACID TO ITS TOXIC DERIVATIVE DEHYDROASCORBIC ACID, MAY BE RESPONSIBLE FOR RADIOBIOLOGICAL DAMAGE; BLOOD AND TISSUE LEVELS OF ASCORBIC, DEHYDROASCORBIC, AND DIKETOGULONIC ACID WERE DETERMINED FOLLOWING EXPOSURE TO X-RAYS.
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DETERMINATION OF THE GEOMETRY OF HIDDEN DEFECTS IN METALS AND OTHER SOLIDS BY THE ULTRASONIC PULSE ANALYSIS TECHNIQUE.
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*VIRUSES

A COMPILATION OF PAPERS ON VARIOUS RESPIRATORY DISEASES ENCOMPASSING THE ETIOLOGICAL AGENTS AND THE EPIDEMIOLOGICAL ASPECTS. INCLUDED ARE DISCUSSIONS ON EATON'S AGENT, COASACKIE VIRUSES, PPLO, ADENOVIRUSES, TISSUE CULTURE STUDIES, INFLUENZA VIRUSES, AND THE CYTOPATHOGENIC EFFECTS OF VIRUSES.
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A MODEL FOR EVALUATING SURFACE-TO-SURFACE FIREPOWER. FUNDAMENTAL EQUATIONS INVOLVING ACCURACY, LETHALITY, RATE OF FIRE, WEIGHT, RANGE, MOBILITY, RELIABILITY AND NATURE OF TARGET.
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THE PROPAGATION OF ERROR IN NUMERICAL INTEGRATION OF THE DISCRETE VORTICITY EQUATION.
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***WEIGHTLESSNESS**

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AD-286 474 DIV. 17

***WELDING**

SHORT HANDBOOK OF TECHNOLOGY AND MACHINE BUILDING. CONTAINS TABLES DEALING WITH MATERIAL (METALS, PLASTICS, RESINS, ADHESIVES, WOOD PULP, PLYWOOD, ETC.) PROPERTIES, WELDING, MANUFACTURING AND MACHINING METHODS.
AD-286 590 DIV. 26

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***WELDS**

PROGRESS REPORT ON T WELD SPECIMENS AND SEPTUM ASSEMBLIES, REVISION OF TOOLS.
AD-286 268 DIV. 26

EVALUATION OF VASCOJET 1000 FLASH-WELDED JOINTS. DETERMINATION OF TENSILE AND AXIAL TENSION-TENSION FATIGUE PROPERTIES OF FLASH-WELDED JOINTS IN VASCOJET 1000 PLATE HEAT TREATED TO AN ULTIMATE TENSILE STRENGTH BETWEEN 260,000 AND 280,000 PSI. TENSILE STRENGTH JOINT EFFICIENCY 66%.
AD-286 283 DIV. 26

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***WINDSHIELD WIPERS**
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EXPLODING WIRES.
AD-286 497 DIV. 25

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RESEARCH WAS CONDUCTED TO DETERMINE THE FACTORS RESPONSIBLE FOR THE POOR GAS LIKE PERFORMANCE OF A SERIES OF DIFFUSION BOARD MATERIALS.
AD-285 679 DIV. 14

MARINE LAMINATING PROPERTIES OF SELECTED WOOD SPECIES. WEATHERING EXPOSURE EVALUATIONS WERE MADE PERIODICALLY UP TO 2 YEARS ON A SERIES OF DOMESTIC, FOREIGN AND TREATED WOOD LAMINATES. FIFTY OF 75 SPECIMENS SHOWED SATISFACTORY QUALITIES. IN GENERAL, VERY HIGH DENSITY SPECIES WERE UNSATISFACTORY WHEN LAMINATED UNDER CONDITIONS SUITABLE FOR WHITE OAK HEARTWOOD.
AD-285 861 DIV. 14

LIST OF REPORTS ON STRUCTURAL SANDWICH, PLASTIC LAMINATES, AND WOOD-BASE AIRCRAFT COMPONENTS AVAILABLE AT THE FOREST PRODUCTS LABORATORY, MADISON 5, WISCONSIN.
AD-286 262 DIV. 14

THE METHODS COMMONLY USED TO CUT AND DRY VENEER ARE DESCRIBED. THE VENEER INDUSTRY AND ITS PRODUCTS ARE ALSO DISCUSSED.
AD-286 264 DIV. 14

***WOOD PULP**

RESEARCH WAS CONDUCTED TO DETERMINE THE FACTORS RESPONSIBLE FOR THE POOR GAS LIKE PERFORMANCE OF A SERIES OF DIFFUSION BOARD MATERIALS.
AD-285 679 DIV. 14

***X-RAY PHOTOGRAPHY**

AN X-RAY STUDY OF DISPERSED NI-MO PRECIPITATES OBTAINED BY ELECTROLYSIS: UNIT CELL DIMENSIONS, LATTICE DISTORTION, AND CRYSTAL STRUCTURE.
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***X-RAY SPECTROSCOPY**

THE ORIGIN OF SATELLITE LINES IN X-RAY SPECTRA SERIES.
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***X RAYS**

A SURVEY OF LITERATURE PERTAINING TO SMALL-ANGLE AND LOW-ANGLE X-RAY EMPHASIZING STUDIES OF PARTICLE SIZE.
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STUDY OF INTERNAL DISPLACEMENTS IN SOLID PROPELLANT GRAIN MODELS USING AN X-RAY DEFLECTION SYSTEM AND THE EMBEDDED PARTICLE TECHNIQUE.
AD-286 559 DIV. 10

CRYSTAL STRUCTURES, MAGNETIC PROPERTIES, AND COMPOSITION OF V(1)S(8) AND VS(1 X) PHASES, WHERE

X IS 1 TO 1.55. VS COMPOUNDS PREPARED FROM HIGH PURITY ELEMENTS.
AD-286 671 DIV. 25

*ZINC

THREE RUSSIAN ARTICLES ON DIFFRACTION OF SLOW ELECTRONS IN GRAPHITE, ZN, AND AL. DIFFRACTION OF SLOW ELECTRONS FROM GRAPHITE AND ZN WAS STUDIED BY THE METHOD OF CONSTANT ANGLES. DIFFRACTION OF SLOW ELECTRONS IS SIGNIFICANTLY MORE COMPLICATED THAN THAT OF FAST ELECTRONS AND X-RAYS.
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THE USE OF RADIOACTIVE INDICATORS IN STUDYING CORROSION INHIBITION ON ZN. CORROSION CAUSED BY A CURRENT SUPERIMPOSED FROM THE OUTSIDE.
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*ZINC COMPOUNDS

DESIGN CRITERIA FOR LONG LIFE, LIGHT WEIGHT SEALED SECONDARY BATTERIES FOR MILITARY AERO-SPACE APPLICATION BY INVESTIGATING SILVER OXIDE-ZINC POTASSIUM HYDROXIDE ELECTROCHEMICAL SYSTEM.
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*ZONE MELTING

PREPARATION OF HIGH PURITY BE BY ZONE MELTING AND THE STUDY OF ITS DEFORMATION AND FRACTURE CHARACTERISTICS.
AD-285 676 DIV. 17

TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-285 822 Div. 1
(TISTA/GEC) OTS price $2.25

Flight Control Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
COCKPIT DISPLAYS FOR ALL-WEATHER LANDINGS.
Final rept. on Control-Display Integration Program.
July 62, 90p. incl. illus. tables, 24 refs.
(Rept. no. and Proj. FAA/BRD 114-15-2D)
Unclassified report

DESCRIPTORS: *Cockpits, *Flight instruments, All weather aviation, Airplane landings, Effectiveness, Tests, Display systems, Instrument panels.

Three instrument display systems, designed to augment all-weather landing capabilities of aircraft, were evaluated in a flight simulator test program. The display instruments were of 2 basic types, a conventional round dial and fixed scale with a moving pointer, and 2 vertical scales with moving tape instruments. These instruments are designed to display 2 new flight parameters, absolute altitude below approximately 300 ft and instantaneous vertical velocity of the aircraft. These parameters are presented to help the pilot maintain positive position control during the critical approach and landing phase of flight. The experimental data was developed by participation of twenty-four highly qualified pilot subjects in the test program. The results show that there is very little performance difference between the 3 instruments. The Round Dial did consistently yield slightly better terminal performance in that it never resulted in a touchdown short of the runway or over 4000 ft down the runway. Both other instruments had a larger variation about the optimum touchdown point. Pilot attitudes for the concept and the instruments were extracted by 3 types of questionnaire. The landing capability concept was well received. Opinions expressed on the Phase II-A indicated acceptance of absolute altitude and its location in the simulator as it was relatively easy to use. (Author)

AD-285 829 Div. 1
(TISTA/SEB) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
RECORDS OF A WINGED LAD,
by D. Pipko. 10 Aug 62, 3p. incl. illus.
(Trans. no. FTD-TT-62-1079 from Izvestiya 56:pp. 6, 7 Mar 62)
Unclassified report

DESCRIPTORS: *Jet planes, *Liaison planes, *Gliders, Jet propulsion, Translations, USSR, Design.

AD-285 838 Div. 1
(TISTA/GEC) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
POST WAR PASSENGER AIRCRAFT. ACCEPTANCE OF THE JET ENGINE BY THE CIVIL AVIATION,
by R. I. Vinogradov, and A. V. Minayev.
12 July 62, 23p. incl. illus. tables (Trans. no. FTD-TT-62-570 from Samolety SSSR. Kratkiy Ocherk Razvitiya, Oborongiz, Moscow, 2nd Ed., pp. 276-299, 1961)
Unclassified report

DESCRIPTORS: *Air transportation, *Civil aviation, Transport planes, Jet planes, Turbojet engines, Turbopropeller jet engines, Jet fighters, USSR.

The history of civil aviation in the USSR is reported. Passenger aircraft, their development and performance are presented.

AD-285 859 Div. 1
(TISTA/GEC) OTS price $1.60

Naval Air Test Center, Patuxent River, Md.
EVALUATION OF A4D-2/2N WINDSHIELD WIPER INSTALLATION.
Rept. no. 1 (Final),
by R. F. Weimorts. 28 Aug 62, 8p. incl. illus. table (Proj. RAE-335-93; ST31-357)
(WEPTASK RA1200001/2011/F012 15 002)
Unclassified report

DESCRIPTORS: *Windshield wipers, Naval aircraft, Jet bombers, Flight testing, Take-off, Airplane landing, Climatic factors, Attack bombers, Effectiveness, Aircraft equipment.

A service suitability evaluation was made of an A4D-2/2N windshiled wiper installation. The windshield wiper was evaluated in light, moderate and heavy rain for a total of 10.5 hours operating time. The wiper significantly improved visibility through the center windshield panel during taxi, takeoff, approach and landing in all forms of rain. However, location of the wiper control switch is unsatisfactory for service use. Pending suitable relocation of the control switch, the windshield wiper installation is acceptable for service use. (Author)

AD-285 936 Div. 1
(TISTA/GEC) OTS price $4.60

Air Force Proving Ground Command, Eglin Air Force Base, Fla.
F-101B EXTERNAL TOW SUBSYSTEM. A PRELIMINARY EVALUATION OF CERTAIN COMPONENTS,
by Wayne M. Kaser. Oct 62, 39p. incl. illus. table (Rept. no. APGC TDR 62-56)
(Proj. 7831W12) Unclassified report

DESCRIPTORS: *Jet fighters, *Aerial targets, Flight testing, Reels, Launching, Recovery, Aircraft equipment, Towing cables, Towing planes, Towed bodies.

An engineering evaluation was made of certain components of the F-101B tow subsystem in a restricted flight envelope. These components consist of the Aero 45A reel-launcher and TDU-9/B and TDU-17/B targets. The Aero 45A was adapted from the Navy Aero 45 reel-launcher to provide the F-101B aircraft with a supersonic tow capability for training with GAR and MB-1 weapons. Eleven missions were conducted to test the tow

subsystem compatibility with the F-101B aircraft, limited structural integrity, overall reel-launcher performance, and recovery techniques. The TDU-9/B target was launched and recovered 27 times with no target losses. The TDU-17/B target was launched three times and recovered once. Two TDU-17/B targets were lost during reel-out. Throughout the test 1/8-in. armored cable was used. Detailed operation procedures and limited training requirements were established. It was concluded that, with several modifications, the Aero 45A reel-launcher was adequate in design and was compatible with the F-101B aircraft. Further testing is required using production targets and proper size tow cable for a complete tow subsystem evaluation. (Author)

AD-285 985 Div. 1
(TISTA/SEB) OTS price $1.10

Hughes Aircraft Co., Culver City, Calif.
(No title).
Monthly progress rept. no. 1, 1 June-1 July 62. 1 July 62, 7p. (Rept. no. 62H-3921/9299)
(Contract AF 33(657)8822, Proj. 9056)
Unclassified report

DESCRIPTORS: *Fuel consumption, *Supersonic planes, Transport planes, Turbojet engines, Take-off, Landing, Jet planes, Jet fighters, Computers, Research program administration, Programming.

AD-285 986 Div. 1
(TISTA/SEB) OTS price $1.10

Hughes Aircraft Co., Culver City, Calif.
(No title).
Monthly progress rept. no. 2, 30 July-26 Aug 62. 27 Aug 62, 9p. incl. table (Rept. no. 62H-5484/9299)
(Contract AF 33(657)8822)
Unclassified report

DESCRIPTORS: *Fuel consumption, *Supersonic planes, Transport planes, Turbojet engines, Research program administration, Jet planes.

AD-286 134 Div. 1
(TISTA/GEC) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
FASTER THAN TIME,
by D. Pipko. 28 May 62, 10p. (Trans. no. FTD-TT-62-702 from Znaniye - Sila, No. 1, pp. 19-21, 1961)
Unclassified report

DESCRIPTORS: *Transport planes, Ramjet engines, Turbojet engines, External combustion engines, USSR, Shock waves, Design, Supersonic planes, Supersonics.

A discussion is presented of supersonic transport plane developments in the USSR.

AD-286 235 Div. 1, 14
(TISTM/ODN) OTS price $1.10

General Dynamics/Fort Worth, Tex.
B-58 WING A. O. SMITH PYLON BOX FORGINGS - MECHANICAL PROPERTIES - DETERMINATIONS OF,
by R. L. James. 16 July 62, 4p. incl. illus. table (Rept. no. FTDM-2796)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Airplanes, *Wings, *Forging, Steel, Alloys, Tensile properties, Heat treatment, Mechanical properties, Airplane protuberances, Materials.

AD-286 318 Div. 1, 9
(TISTA/VGW) OTS price $9.10

Aeronutronic, Newport Beach, Calif.
OVERLAND AIR-CUSHION VEHICLE STABILITY AND CONTROL WIND TUNNEL EXPERIMENTS.
Technical rept. on Special Programs Operations,
by B. H. Carmichael and D. E. McNay. 10 Nov 61, 91p. incl. illus. table, 2 refs. (Publication no. U-1447)
(Contract DA 44-177-tc-709)
(TCREC TR 62-35) Unclassified report

DESCRIPTORS: *Flying platforms, *Ground effect, Airframes, Design, Wind tunnel models, Model tests, Stability (Lateral), Stability (Longitudinal), Yaw, Pressure, Shrouded propellers, Control systems, Aerodynamics, Ducted fans.

The static stability in pitch, roll, and yaw of a generalized annular jet GEM has been determined in hover and forward flight at ratios of h/d exceeding 0.1, the normal stability limit. The effects of modifications to the basic configuration, including full and partial skirting, were determined. In addition to stability data, control forces and some performance and pressure distribution data were obtained.

AD-286 327 Div. 1
(TISTA/GEC) OTS price $7.60

Systems Technology, Inc., Inglewood, Calif.
AN ASSESSMENT OF OPERATIONAL AND COST TRADEOFF FACTORS FOR A TYPICAL HIGH PERFORMANCE AFCS.
Final rept. on Phase 1,
by D. E. Johnston and D. H. Weir. June 62, 66p. incl. illus. tables, 23 refs. (Technical rept. no. 119-1)
(Contract NOw 61-0358-c)
Unclassified report

DESCRIPTORS: *Attack bombers, Jet bombers, Naval aircraft, Effectiveness, Reliability, Costs, Automatic pilots, Maintenance, Operation, Feedback, Stability, Stability (Lateral), Stability (Longitudinal), Servomechanisms, Aircraft equipment, Control systems.

Preliminary design evaluation and optimization techniques were applied to an existing operational manned aircraft flight control system (AFCS) to determine the possibility of improvements in unreliability, maintainability, operability, and initial cost derived, without sacrifice in performance, from an approach which views pilot, controller, and vehicle as components of an integrated whole; and the payoffs realizable by tailoring the controller-airframe-specification combination to take full advantage of pilot capabilities so that a balance is struck between manual and automatic means of accomplishing control functions. The A4D-2N aircraft and its AFCS were studied. The system is broken down to fundamental piece-part levels (e.g., resistor, transformer, actuator, synchro, etc.) and the relative contribution of each piece-part is evaluated. The individual contributions are then grouped by function (e.g., positional servo loop, rate feedback loop, etc) and by control axis to determine the over-all cost of the function and its relative contribution to the total system cost. A summary is presented of the preceding assessments in the form of generic tradeoff plots of cost versus system complexity. (Author)

AD-286 433 Div. 1
(TISTA/GEC) OTS price $10.50

Air Force Flight Test Center, Edwards Air Force Base, Calif.
B-52G CATEGORY II PERFORMANCE, STABILITY AND

CONTROL TESTS (APPENDIX III),
by Philip J. Conley, Jr., and John M. Carlson.
Jan 60, 135p. incl. illus. (AFFTC TR 59-34, app. 3 to AD-231 345)
Unclassified report

DESCRIPTORS: *Jet bombers, Aerodynamics, Aerodynamic data, Take-off, Acceleration, Airplane landings, Tables, Flight testing.

Contents:
Takeoffs
Level accelerations
Check climbs
Speed power
Descents
Landings

AD-286 479 Div. 1, 18
(TISTA/VGW) OTS price $1.60

Office of the Inspector General, Norton Air Force Base, Calif.
AIRCRAFT ACCIDENT POTENTIAL RELATED TO PILOT AGE AT TIME OF GRADUATION,
by E. C. Lentz and Anchard F. Zeller. 2 July 62, 15p. incl. tables, 4 refs.
Unclassified report

DESCRIPTORS: *Aviation safety, *Pilots, *Aviation accidents, Military training, Transfer of training, Statistical analysis, Effectiveness, Age.

A project was initiated to determine whether or not the age at which an individual finishes pilot training was related to his subsequent accident history. The over-all findings offer support for the hypothesis that younger pilot graduates have a better subsequent accident record than the older. The fact that younger pilots experienced a higher accident rate during their early hours of rated flying than did the pilots who received their wings when 25 years of age or older is apparently the result of the previous experience of some of the pilot graduates. When those pilots who had had previous rated, though non-pilot, experience were eliminated from consideration, the anticipated results appear. The reversal of trend with the previously rated individuals included results from the fact that, on the whole, those who had received prior training were older and had been exposed to a period of screening leads to a better end product is of theoretical interest, but because of the expense and time involved it would not appear to be practically feasible as a standard procedure.

AD-286 483 Div. 1, 18
(TISTA/SEB) OTS price $1.10

Hughes Aircraft Co., Culver City, Calif.
CONTROL DATA REQUIREMENTS INVESTIGATION FOR OPTIMIZATION OF FUEL ON SUPERSONIC TRANSPORT VEHICLES.
Monthly progress rept. no. 3, 27 Aug-30 Sep 62. 1 Oct 62, 6p. incl. illus. (Rept. no. 62H-5670/9299)
(Contract AF 33(657)8822, Proj. 9056)
Unclassified report

DESCRIPTORS: *Transport planes, *Fuel consumption, Supersonic planes, Combat, Afterburners, Jet planes, Jet fighters, Operations research, Turbojet engines, Operation.

Minimum afterburner simulation runs are being studied. A step-change reduction in power setting is made from maximum afterburner power to minimum afterburner power at 40,000 feet altitude. Using minimum afterburner power at conditions near 60,000 feet and Mach 3 has shown poorer fuel economy than full afterburner power settings. These simulation runs are for the accelerating climb profile. All of these nominal power settings are still based on the F-108/J-93 airframe/engine combination. (Author)

AD-286 515 Div. 1
(TISTA/GEC) OTS price $1.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
CONSIDERATION OF AIRCRAFT AS EMERGENCY SHELTERS,
by Paul W. Barnett. June 62, 10p. incl. illus. 2 refs. (Rept. no. AAL TDR 62-29)
(Proj. 8242-1)
Unclassified report

DESCRIPTORS: *Aircraft, *Aviation accidents, *Fuselages, *Survival, Arctic regions, Heaters, Exposure, Feasibility studies, Temperature, Heating, Shelters.

Feasibility studies were made of using a downed aircraft as an emergency shelter, and the possibility of improvision of a petroleum burning stove. Profiles of temperatures of the occupied shelters, as well as of those with the improvised stove installed and operating, and of ambient temperatures are presented. Ambient temperatures range from -18 to -39 F. Pictures of the improvised stove and tools required in its construction are shown. The uninsulated, unheated aircraft is not adequate shelter for extreme cold environments. Stove improvision is practical. (Author)

AD-286 526 Div. 1, 22
(TISTW/JRG) OTS price $2.60

Air Force Proving Ground Command, Eglin Air Force Base, Fla.
STRUCTURAL COMPATIBILITY TEST OF M61 GUN/LINKLESS FEED SUBSYSTEM AND F-105D AIRCRAFT,
by Philip P. Panzarella. Oct 62, 25p. incl. illus. tables (Rept. no. APGC TDR 62-57)
(Proj. 306AZ16)
Unclassified report

DESCRIPTORS: *Jet fighters, *Aircraft guns, *Airplane noses, Automatic weapons, Shock, Vibration, Shock resistance, Fracture (Mechanics), Tests, Structures, Feed mechanisms, Stresses.

The M61 gun/linkless feed subsystem was designed to provide the F-105D with a compact, self-contained, high rate firing capability. The primary object of this test was to determine the effects of this subsystem on the structural integrity of the aircraft nose structure. As a result, it was concluded that the subsystem imposes no serious structural limitations on the F-105D; however, because of the effects of gun gas, the firing envelope of the aircraft is limited. Modifications to the basic M61 gun/linkless feed subsystem (oiler, undercut barrels, modified blast tube, and interrupter relay) were tested and found to be satisfactory. There is a problem in maintaining the M61 gun/linkless feed subsystem since 134 man-hr are required to repair the subsystem after a stoppage occurs. (Author)

AD-286 576 Div. 1
(TISTA/SEB) OTS price $11.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PROBLEMS OF THE AERODYNAMICS OF HELICOPTER LIFTING ROTORS (Voprosy Aerodinamiki Nesushchikh Vintov Vertoletov).
3 Oct 62, 155p. incl. illus. tables, 10 refs.

(Trans no. FTD-TT-62-815 from Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo Oborongiz, Moskva, 141p., 1961)

Unclassified report

DESCRIPTORS: *Helicopter rotors, Load distribution, Lift, Vortices, Velocity, Aerodynamics, Take-off, Landing, Mathematical analysis, Theory, USSR, Translations.

Results of experimental research on helicopter rotors are presented in the hovering regime. Optimum parameters are discussed for heavily loaded rotors. A generalized vorticity theory of the helicopter lifting rotor is set forth; this makes it possible to determine the induced velocity at any point in space for the basic flight mode. The results of aerodynamic research on computation of the flight characteristics of the helicopter rotor in the vertical-descent mode are set forth. Methods are given for determining the characteristics of the rotor. (Author)

AD-286 694 Div. 1
(TISTA/GEC) OTS price $2.60

Air Force Proving Ground Command, Eglin Air Force Base, Fla.
COMPATIBILITY TEST OF THE A/A37U-15 TOW SUBSYSTEM WITH THE F-84 AIRCRAFT,
by Robert J. Tracy. Oct 62, 20p. incl. illus. table (Rept. no. APGC TDR 62-58)
(Proj. 7831W13)

Unclassified report

DESCRIPTORS: *Jet fighters, *Towed bodies, *Aerial targets, Flight testing, Launching, Airplane protuberances, Towing planes.

A compatibility test was conducted of the A/A37U-15 tow subsystem with the F-84 aircraft. This subsystem was designed to provide the Tactical Air Command with a transonic tow target capability for gunnery training for the F-104, F-100C/D, F-86H and F-84F aircraft. Missions were conducted to test the tow subsystem for ground and airborne compatibility with the F-84F aircraft. The operation of the tow subsystem during launch and tow and performance capabilities while flying typical mission profiles were evaluated. It was concluded from the test that the tow subsystem can be satisfactorily used in normal towing operations with the F-84F aircraft. (Author)

AD-286 834 Div. 1
(TISTA/SEB) OTS price $1.00

Southampton U. (Gt. Brit.).
AN EXPERIMENTAL INVESTIGATION OF THE RANDOM EXCITATION OF A TAILPLANE SECTION BY JET NOISE.
Rept. for Mar 60-Nov 61 on Metallic Materials,
by B. L. Clarkson and R. D. Ford. July 62, 33p. incl. illus. tables, 4 refs.
(Contract AF 61(052)504, Proj. 7351)
(ASD TDR 62-680) Unclassified report

DESCRIPTORS: *Tails, Jet planes, Jet engine noise, Vibration, Frequency, Resonance, Stroboscopes, Stresses, Pressure, Tests, Air frames.

The response of a section of tailplane structure to both discrete and random noise pressures was studied in detail. Initially the specimen was mounted behind a jet engine and the induced strains were analyzed with the object of determining both the resonant frequencies and the corresponding modes of vibration. During these tests a survey was made of the spectrum and correlation pattern of the jet noise on the surface of the model. Secondly the specimen was mounted in front of a loudspeaker in an acoustics laboratory and the structural resonances were excited by means of discrete frequency sound. The mode shapes were studied in detail with the aid of a stroboscope. The tailplane skin on this particular piece of structure only responds to any significant degree in one structural mode. Although reasonable comparison was obtained between the random and discrete tests, it was not possible to calculate the induced stresses using the observed mode shapes and measured pressure excitation. (Author)

AD-286 879 Div. 1, 14
(TISTA/SEB) OTS price $8.60

National Aviation Facilities Experimental Center, Atlantic City, N. J.
CALCULATION OF THE STRENGTH OF CRASH-RESISTANT FUEL CELLS FOR THE WINGS OF A TWIN-ENGINE AND A FOUR-ENGINE TRANSPORT AIRPLANE.
Final rept.,
by D. A. Hillman and R. J. Schroers. Apr 61, 10 p. incl. illus. tables.

Unclassified report

DESCRIPTORS: *Fuel tanks, Impact shock, Load distribution, Transport planes, Stresses, Nylon, Rubber, Materials, Impregnation, Pressure, Shear stresses, Tables, Aviation safety, Aviation accidents, Shock resistance.

Crash-resistant wing fuel tanks for aircraft are being studied. From previous tests, it was determined that the rubber-impregnated nylon fabric tank possesses the greatest merit for preventing fuel spillage during crashes. A method is presented by which crash-test data, obtained previously, can be applied in determining the strength of fuel cells installed in the wings of actual aircraft. (Author)

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-285 612 Div. 2
(TISTP/GRW) OTS price $3.60

4th Weather Wing, Colorado Springs, Colo.
A CASE HISTORY INVESTIGATION OF WINTER STORMS WHICH PRODUCE SUSTAINED SURFACE WIND SPEEDS 50 KNOTS OR GREATER AT TEXAS TOWER 2 AND TEXAS TOWER 3,
by J. Restivo, D. Barbarick and G. Reiter. Sep 62, 39p. incl. illus. tables, 15 refs.

Unclassified report

DESCRIPTORS: *Radar stations, Storms, Hazards, Wind, Atlantic Ocean, Climatic factors.

AD-285 630 Div. 2
(TISTP/GRW) OTS price $9.60

New York U. Coll. of Engineering, N. Y.
MESOSPHERE DYNAMICS.
Final rept., 1 May 59-30 Nov 61,
by Julius London, Katsuyuki Ooyama, and Cuddapah Prabhakara. May 62, 108p. incl. illus. tables, 36 refs.
(Contract AF 19(604)5492, Proj. 8604)
(AFCRL 62-672) Unclassified report

DESCRIPTORS: *Ozone, *Stratosphere, Distribution, Dynamics, Thermodynamics, Absorption, Infrared radiation, Abundance.

Contents:
Accuracy of the determination of the vertical distribution of atmospheric ozone by the infrared method

Absorption processes in the stratosphere and mesosphere
The distribution of total ozone in the northern hemisphere

AD-285 646 Div. 2
(TISTP/GRW) OTS price $8.10

Air Force Cambridge Research Labs., Bedford, Mass.
BIBLIOGRAPHY OF LUNAR AND PLANETARY RESEARCH, 1961,
by John W. Salisbury, Roger A. Van Tassel, and Joel E. M. Adler. July 62, 81p. refs. (Rept. no. AFCRL 62-676)
(Proj. 8602)
Unclassified report

DESCRIPTORS: *Moon, *Planets, Astrophysics, Meteors, Meteorites, Bibliography.

This bibliography of lunar and planetary research published in 1961 contains a list of articles both by author and by subject, with each article abstracted. The subject categories are: astrobiology, comets, exploration programs and probes, interplanetary magnetic field, meteorite craters and cratering effects, meteors and meteorites, Moon, origin of the solar system, planets, and tektites. (Author)

AD-285 796 Div. 2
(TISTP/GRW) OTS price $8.60

Air Force Cambridge Research Lab., Bedford, Mass.
ERRORS IN SIX AND TWELVE HOUR PREDICTIONS OF UPPER LEVEL WINDS,
by E. M. Darling, Jr. Jul 62, 88p. incl. illus. tables, 12 refs. (AFCRL 62-682)
Unclassified report

DESCRIPTORS: *Wind, *Weather forecasting, High altitude, Errors, Statistical analysis, Tables, Periodic variations.

Analysis of a large sample of wind forecasts for 6- and 12-hr periods reveals that subjective forecasts are linearly related to the wind at the beginning of the forecast interval. This relationship enables the development of a regression equation between forecast error and persistence error making it possible to extend the results derived from this sample. The variation of forecast and persistence errors with geography, level and season is discussed. The maximum advantage of subjective forecasts over persistence is 10% for 6-hr periods and 20% for 12-hr periods. (Author)

AD-285 856 Div. 2
(TISTP/FR) OTS price $4.60

Northeastern U., Boston, Mass.
ON THE STEADY-STATE DYNAMICS OF SPIRAL GALAXIES,
by Howard D. Greyber. 1 June 62, 40p. incl. illus. tables, 48 refs. (Scientific rept. no. 3)
(Contract AF 49(638)555)
(AFOSR-2958) Unclassified report

DESCRIPTORS: *Galaxies, *Interstellar matter, Plasma physics, Magnetic fields, Magnetohydrodynamics.

In the theory discussed, ideas of plasma physics and magnetohydrodynamics are invoked for explaining the general circulation of gas through a spiral galaxy. In particular a general dipole magnetic field in the region close to the center of the galaxy (whose axis roughly coincides with that for the galaxy) is assumed and the consequences studied. Thus for the charged gas and dust, gravitational and magnetic forces are assumed to play comparable roles. Before discussing the theory however, we must review the evidence for the structure of spiral galaxies, especially in the neighborhood of the galactic center. (Author)

AD-285 863 Div. 2
(TISTP/FR) OTS price $6.60

Ionosphere Research Lab., Pennsylvania State U., University Park.
IONOSPHERIC CURRENT PATTERNS IN HIGH LATITUDES,
by D. H. Fairfield. 15 Oct 62, 65p. incl. illus. tables, refs. (Scientific rept. no. 171)
(Contract AF 19(604)4563, Proj. 8605 and Grant no. G-18983)
(AFCRL 62-1006) Unclassified report

Original contains color plates: All ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: *Ionosphere, *Electric currents, *Terrestrial magnetism, Magnetic storms, Diurnal variations, Periodic variations, Arctic regions.

High latitude current systems utilizing IGY magnetograms from polar regions are discussed. The deviations of the current patterns from idealized DS current systems are investigated. Emphasis is placed on the study of currents on quiet days. (Author)

AD-285 875 Div. 2
(TISTP/GRW) OTS price $6.60

Electrical Engineering Research Lab., U. of Texas, Austin.
SUMMARY OF PROCEEDINGS OF THE CONFERENCE ON TROPICAL METEOROLOGY, ASBURY PARK, NEW JERSEY, 10-11 MAY 1962, SPONSORED BY U.S. ARMY SIGNAL RESEARCH AND DEVELOPMENT LABORATORY FORT MONMOUTH, NEW JERSEY.
Rept. on Research in Tropical Meteorology,
by Wilfried H. Portig and John R. Gerhardt.
30 Sep 62, 50p. illus. (Rept. no. 7-22)
(Contract DA 36-039-sc-89179, Proj. 3A99-27-005)
Unclassified report

DESCRIPTORS: *Meteorology, Tropical regions, Precipitation, Conferences.

Summary is given of the proceedings of the Conference on Tropical Meteorology held at Asbury Park, New Jersey, over the period from 10-11 May 1962. The Conference had as its primary objective the evaluation of the current status of our knowledge of meteorological processes in the tropics as they apply to the mesometeorological scale for land areas. (Author)

AD-285 879 Div. 2
(TISTP/FR) OTS price $4.60

Stanford U., Calif.
PALEOMAGNETISM OF A THICK TERTIARY VOLCANIC SEQUENCE IN NORTHERN CALIFORNIA,
by Myrl E. Beck. June 62, 45p. incl. illus. tables (Scientific rept. no. 1)
(Contract AF 19(604)8043, Proj. 8623)
(AFCRL 62-821) Unclassified report

DESCRIPTORS: *Terrestrial magnetism, *Rock, Magnetic properties, California, Volcanoes.

A paleomagnetic study of the Western Cascade series of late Eocene to Miocene age was made to determine changes in position and reversals in polarity of the geomagnetic pole. Included are petrography of the series, laboratory and field procedures, and paleoclimatic implications of the

results. Statistical analysis indicates that the geomagnetic pole during Western Cascade series time underwent a systematic fluctuation of considerable magnitude about a central location in northwest Greenland. Magnetic variations of this sort during Tertiary time can logically be ascribed either to polar wandering or to a period of long-term departure of the dipolar component of the geomagnetic field from an axial orientation.

AD-285 928 Div. 2
(TISTP/GRW) OTS price $1.10

Aerospace Information Div., Washington, D. C.
UNDERSEA GEOPHYSICAL EXPLORATION,
by V. Levchenko. 9 July 62, 2p. (AID rept. no. 62-99; Trans. from Scientific and Technical Conference on Undersea Geophysical Exploration. Sovetskaya Geologiya; No. 5:pp. 165-171, May 1962.)
Unclassified report

DESCRIPTORS: *Ocean bottom, Geological survey, Exploration.

AD-285 929 Div. 2
(TISTP/GRW) OTS price $1.10

Aerospace Information Div., Washington, D. C.
VARIATIONS OF THE GEOMAGNETIC FIELD,
by S. P. Burlatskaya. 21 June 62, 2p. (AID rept. no. 62-85; Trans. from The Archaic Magnetic Field of the Earth. IN: Akademiya Nauk SSSR. Izvestiya. Seriya Geofizicheskaya, No. 4:pp. 524-528, 1962.)
Unclassified report

DESCRIPTORS: *Terrestrial magnetism, Earth, Geological survey.

AD-285 981 Div. 2
(TISTP/FR) OTS price $1.10

Geophysical Inst., U. of Alaska, College.
RESEARCH DIRECTED TOWARD CORRELATION OF VISUAL AURORA WITH AURORAL RADAR ECHOES.
Final rept.,
by Robert S. Leonard. Aug 62, 6p. incl. illus.
(Rept. no. UAG R128)
(Contract AF 19(604)7446)
(AFCRL 62-596) Unclassified report

DESCRIPTORS: *Aurorae, Radio waves, Very high frequency, Scattering, Measurement.

The purpose of this investigation was to separate VHF auroral radar echoes into two classes, depending on the shape of the scattering region, and then to compare these echoes with visual aurora present in the same part of the sky. To do this, two auroral radars examining nearly the same portion of the sky were operated at College and Healy, Alaska with extra receivers located at College and Ft. Yukon, Alaska, to also receive the scattered signals. To determine the visual aurora, all-sky cameras were operated at both College, and Ft. Yukon, Alaska. (Author)

AD-285 999 Div. 2
(TISTP/GRW) OTS price $1.10

Arizona U., Tucson.
PHOTOMETRY OF THE PLANETS.
Final rept., 1 July 61-31 July 62,
by Thomas Gehrels. 31 July 62, 3p.
(Grant Nonr (G) 00021-61)
Unclassified report

DESCRIPTORS: *Planets, Venus, Polarization, Light, Stars, Optical analysis.

AD-286 044 Div. 2
(TISTP/FR) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
SOLUTION OF NON-STEADY SOIL MOISTURE TRANSFER,
by William D. Ohmstede. 1962, 11p. incl. illus. 1 ref.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 62, United States Military Academy, West Point, New York.

DESCRIPTORS: *Soils, Moisture, Partial differential equations.

A mathematical model of soil moisture transfer, including assumptions and limitations, is described. The model is a second order, nonlinear partial differential equation whose solution represents non-steady, one-dimensional soil moisture transfer. A number of solutions, for various boundary and initial condition, obtained by numerical integration on a digital computer are described. These solutions, in conjunction with laboratory experiments with soil moisture extractors can be used to determine the water transmission characteristics of soil. (Author)

AD-286 064 Div. 2
(TISTP/FR) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
WINDS AND ATMOSPHERIC TURBULENCE AT VERY HIGH ALTITUDES,
by Marvin J. Lowenthal. 1962, 12p. incl. illus. tables, 3 refs.
Unclassified report

Presented at the 1962 Army Science Conference, 20-22 June 1962 at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Wind, Turbulence, High altitude, Measurement, Condensation trails, Rockets, Photographic analysis.

Studies of atmospheric turbulence in the 40 - 70 km levels were conducted by means of multiple rocket firings at Cape Canaveral at intervals of 15 to 75 minutes. From these data short term wind variabilities were computed. Although the maximum wind occurred near 50 km, the wind speed variations increased continuously reaching a maximum of 8 mps at 64 kms. Little variation in wind direction is noted up to 45 km with large changes thereafter. (Author)

AD-286 071 Div. 2, 30
(TISTP/WH) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
MESOSPHERIC DENSITY VARIABILITY BASED ON RECENT METEOROLOGICAL ROCKET MEASUREMENTS,
by Otto W. Thiele. 1962, 19p. incl. illus. 23 refs.
Unclassified report

Presented at the 1962 Army Science Conference, 20-22 June 1962 at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Barometric pressure, *Upper atmosphere, *Sounding rockets, *Parachutes, Periodic variations.

Seasonal and latitudinal variability of density between 30 and 68 kilometers is presented. These data were derived from direct temperature and height measurements made with meteorological

rockets fired at White Sands Missile Range, New Mexico, and Fort Churchill, Canada, during 1960-61 Meteorological Rocket Network and R&D activities. Some of the more significant features are the wider seasonal range at northern latitudes, the absence of significant latitudinal variation during the summer, the greater variation in winter at each station and the over-all variation at a particular altitude that can occur -- as much as fifty percent in some cases. The need for both seasonal and latitudinal standard atmospheres where standards are required is clearly demonstrated. Also, the feasibility of making timely density measurements for such problems as re-entry vehicle drag, etc. is evident. (Author)

AD-286 078 Div. 2
(TISTP/GRW) OTS price $8.60

Blue Hill Meteorological Observatory, Harvard U., Milton, Mass.
TWILIGHT INTENSITY AT 20 DEGREE ELEVATION. ANALYSIS AND DISCUSSION OF OBSERVATIONS, AND APPENDIX.
Final rept.,
by F. E. Volz, R. M. Goody, and N. P. Carleton. May 62, 97p. incl. illus. tables, 39 refs. (Contract AF 19(604)4546, Proj. 7690) (AFCRL 62-856) Unclassified report

DESCRIPTORS: *Twilight, Intensity, Particles, Density, Visibility, Stratosphere, Ionosphere, Ozone, Absorption, Scattering, Optical analysis.

Details of 93 twilights are given. An attempt is made to explain these observations and hence derive information about the composition of the atmosphere at high levels. This motivation was a desire to obtain information about stratospheric, mesospheric and possibly ionospheric dust concentrations. Dust has been a neglected atmospheric constituent at high levels, and computations of heat balance and chemical reaction rates normally take no note of its presence. The phenomenon of noctilucent clouds must in some way be related to the aerosol problem, either as the direct source of material or by supplying nuclei of condensation. (Author)

AD-286 115 Div. 2, 7
(TISTP/WH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AN ELECTROMECHANICAL SYSTEM OF PROGRAM CONTROL OF A TELESCOPE,
by Yu. A. Sabinin and Z. N. Mamedova. 18 May 62, 12p. incl. illus. (Trans. no. FTD-TT-62-476 from Izvestiya Vysshikh Uchebnykh Zavedeniy. Elektromekhanika, No. 7, pp. 103-108, 1961) Unclassified report

DESCRIPTORS: *Astronomical cameras, *Servomechanism, *Tracking telescopes, *Photometers, *Star trackers, Tracking, USSR.

AD-286 147 Div. 2
(TISTP/GRW) OTS price $4.60

Air Force Cambridge Research Labs., Bedford, Mass.
MEAN ANNUAL MID-LATITUDE MOISTURE PROFILES TO 31 KM,
by Murray Gutnick. July 62, 30p. incl. illus. tables, 27 refs. (Rept. no. AFCRL 62-681; AF Surveys in Geophysics no. 147) (Proj. 8624) Unclassified report

DESCRIPTORS: *Moisture, *Stratosphere, *Atmosphere models, Dew point, Humidity, Standards, Radiosondes.

Average yearly vertical profiles up to 31 km for middle latitude, derived independently, for mixing ratio and moisture dewpoint-frostpoint, are presented. Since the relation between mixing ratio and frostpoint is non-linear, other moisture expressions were derived from each of the two basic profiles, using standard atmosphere conditions. Up to 7 km, the profiles were derived by an indirect approach; conventional radiosonde humidity measurements were utilized. Above that level the profiles are based upon selected experimental humidity ascents, subjectively selected and weighted. The mixing ratio profile decreases from 6150 parts per million (PPM) at the surface to 9 ppm at 16 km then increases slightly with height; the surface dewpoint is taken as 4 C, decreasing to -78 C at 18 km, then increasing to -71 C at 31 km. (Author)

AD-286 171 Div. 2
(TISTP/GRW) OTS price $9.10

Free U., Berlin (Germany).
PRELIMINARY DAILY NORTHERN HEMISPHERE 30 - MILLIBAR SYNOPTIC WEATHER MAPS OF THE YEAR 1962. PART II. APRIL-JUNE.
Quarterly technical status rept. no. 2,
by Karin Labitzke-Behr, Zdravko Petkovsek and Richard Scherhag. 1962, 106p. incl. illus. 1 ref.
(Contract DA 91-591-EUC-2148) Unclassified report

Original contains color plates; all ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: *Barometric pressure, *Stratosphere, Meteorological charts, Northern hemisphere, Diurnal variations.

AD-286 247 Div. 2
(TISTP/GRW) OTS price $1.10

Aerospace Information Div., Washington, D. C.
LUNAR RADIO EMISSION,
by V. S. Troitskiy. 21 Sep 62, 2p. (AID rept. no. 62-149, Suppl. to AID rept. no. 62-4, AD-275 255; Trans. from Radio Emission from the Moon; the Physical State and Nature of its Surface. IN: Akademiya Nauk SSSR. Komissiya po Fizike Planet. Izvestiya, No. 3; pp. 16-29, 1961) Unclassified report

DESCRIPTORS: *Moon, *Radio astronomy, Extremely high frequency, Extraterrestrial radio waves, Surface temperatures, Extraterrestrial geography.

Measurements of lunar radio emission on wavelengths of from 0.4 to 3.2 cm conclusively show that the surface layer of the moon is approximately homogeneous, at least to a depth of about a meter. These findings invalidate the hypothesized two-layer structure. To compare the electrical parameters of lunar and terrestrial rocks, measurements were made of the angle of loss and of the dielectric constant of volcanic rocks. (Author)

AD-286 249 Div. 2
(TISTP/GRW) OTS price $1.10

Aerospace Information Div., Washington, D. C.
RADIO EMISSION OF VENUS,
by A. G. Kislyakov, A. D. Kuz'min, and A. Ye. Salomonovich. 1 Oct 62, 2p. (AID rept. no. 62-158; Trans. from Radio Emission of Venus on

the 4-mm Wavelength. Astronomicheskiy Zhurnal 39:3, pp. 410-417, May-June 62)
Unclassified report

DESCRIPTORS: *Venus, *Radio astronomy, Extremely high frequency, Extraterrestrial radio waves, Surface temperatures, Brightness.

Radio emission from Venus on the 4-mm wavelength was measured from March to May of 1961, with the 22-meter radio telescope. Periodic standardization of the signals was carried out during the observations. The lunar radio emission was measured to determine the brightness temperature of Venus. (Author)

AD-286 254 Div. 2
(TISTP/GRW) OTS price $3.60

White Sands Missile Range, N. Mex.
PERFORMANCE CHARACTERISTICS OF METEOROLOGICAL ROCKET WIND AND TEMPERATURE SENSORS,
by Norman J. Beyers, Otto W. Thiele, and Norman K. Wagner. Oct 62, 31p. incl. illus. tables, 13 refs. (Technical rept. no. SELWS-M-4)
Unclassified report

DESCRIPTORS: *Atmospheric sounding, *Sounding rockets, Meteorological data, Meteorological balloons, Collecting methods, Sound ranging, Ionosphere, Stratosphere, Wind, Radar confusion reflectors.

Numerous meteorological rocket firings were conducted at missile ranges to obtain atmospheric data in support of missile tests, and the Meteorological Rocket Network resulted in coordinated firings designed to provide a synoptic picture of the high atmosphere. Rocket-borne inertial systems consisting of radar chaff and metalized parachutes were utilized to determine wind flow in the altitude range from 50,000 to 250,000 ft. Fall velocities, parachute oscillations, chaff dispersion, and wind sensor lag times were examined with radar and radiosonde ground equipment. Some of the problems involved in the temperature measuring system (Gamma) are also treated with respect to time constant, radiative effects, compressional and nosecone heating, and internal heating. Typical wind and temperature profiles are presented along with an application of the temperature profile to speed-of-sound and density calculations. (Author)

AD-286 266 Div. 2
(TISTP/FR) OTS price $9.60

Florida State U., Tallahassee.
THE CARBONATE GEOCHEMISTRY AND SEDIMENTOLOGY OF THE KEYS OF FLORIDA BAY, FLORIDA.
Thesis,
by James B. Fleece. June 62, 112p. incl. illus. tables, 50 refs. (Contribution no. 5)
(Contract Nonr 298807)
Unclassified report

DESCRIPTORS: *Sedimentation, Soils, Sand, Particles, Magnesium compounds, Carbonates, Calcite, Carbon, Nitrogen, Strontium.

The texture and mineralogy of the sediments comprising the cores from Florida Bay indicate that the over-all depositional environment in the area studied has remained fairly constant for the past 4000 years. There is some evidence which suggests that the material at the base of each core was deposited at approximately the same time and under very similar conditions. The data indicate that in less than 4000 years several significant geochemical diagenetic alterations have occurred in the carbonate sediments. There is a significant loss of high-magnesium calcite at the base of all the cores. The statistical tests for correlations show that there are a great number of weak interdependences between the ten sediment properties studied. This indicates the extremely complex nature of the process of carbonate sedimentation. (Author)

AD-286 275 Div. 2
(TISTA/SEB) OTS price $2.60

Aerospace Information Div., Washington, D. C.
PHENOMENA IN THE UPPER ATMOSPHERE REVIEW OF SOVIET LITERATURE.
Monthly rept. no. 28 for Aug 62.
27 Sep 62, 23p. incl. illus. tables, 18 refs.
(AID rept. no. 62-135)
Unclassified report

DESCRIPTORS: *Solar energy, *Atmospheric electricity, *Upper atmosphere, *Ionospheric disturbances, Radio signals, Solar flares, Helium, Frequency, Sunspots, Astrophysics, Geophysics, Ionosphere, USSR, Thermionic radiation, Satellite vehicles, Guided missiles, Solar disturbances, Radio interference, Radio waves.

Contents:
Solar radiation and the ionosphere
Telluric currents
Atmospheric electricity
Satellite and missile data

AD-286 276 Div. 2, 15
(TISTP/MS) OTS price $6.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
RESEARCH IN SURVEYING, MAPPING, AND GEODESY.
Quarterly progress rept. no. 7, 4 Mar-3 June 61, by D. L. Birx, J. K. Gleim and others. 3 June 61, 60p. incl. illus. tables, 6 refs.
(Rept. no. Q-A2217-7)
(Contract DA 44-009-eng-3767, Proj.8T35-12-001-01)
Unclassified report

DESCRIPTORS: *Atmospheric refraction, *Satellites, *Stars, *Refractive index, Refraction, Mathematical analysis, Geodetic astronomy, Geodesics, Refractive properties.

This report is in two parts. Part I presents an approach to the solution of the refraction problem which differs mathematically from our previous one. In principle, this approach permits the calculation of the satellite refraction from the stellar refraction with no knowledge of mu other than the value of mu(o). This approach alsodevelops a correction term for the case where the satellite is within the earth's atmosphere, rather than completely above it. Part II discusses the use of passive satellites (of the 'Echo' type) for use as geodetic tools. While the method is possible, its feasibility is limited by the requirements placed on the ground-based RF equipment and antennas. (Author)

AD-286 286 Div. 2
(TISTP/GRW) OTS price $3.60

Deutscher Wetterdienst, Frankfurt (Germany).
BAROCLINIC FORECASTS WITH THE UNFILTERED 5-LAYER MODEL,
by W. Edelmann and H. Reiser. 31 May 62, 10p. illus. ref. (Technical note no. 5)
(Contract AF 61(052)373)
(AFCRL 62-1004) Unclassified report

Original contains color plates: ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: *Atmosphere models, *Weather forecasting, Difference equations, Meteorological charts, Barometric pressure, Northern hemisphere.

The numerical weather prediction group of the German weather service started experiments with an unfiltered 5-layer model using actual weather situations as initial data. In these computations horizontal gradients were approximated by finite differences in the conventional way; the lateral boundary condition was simplified (vanishing normal and tangential component). Though applying considerable horizontal smoothing, it was not possible to suppress an unstable amplification of the short wave-lengths for forecast periods longer than 48 hours. As the conventional finite difference approximation of horizontal pressure gradients is affected by serious defects encountered in the short wave-length range (between 2 and 4 grid increments) a new finite difference scheme was derived. (Author)

AD-286 293 Div. 2
(TISTP/FR) OTS price $2.60

Kiruna Geophysical Observatory (Sweden)
THE HEIGHT DISTRIBUTION OF THE RATIO OF NEGATIVE ION AND ELECTRON DENSITIES IN THE LOWEST IONOSPHERE.
by Bengt Hultqvist. 6 May 62, 23p. incl. illus. table, 31 refs. (Scientific rept. no. 2)
(Contract AF 61(052)601)
(AFCRL 62-1015)
Unclassified report

DESCRIPTORS: *Ionosphere, Electrons, Ions, Density, Cosmic rays, Radio waves, Very low frequency, Absorption.

Available experimental data on nondeviative absorption and VLF propagation conditions in the twilight periods are reviewed. It is shown that there are no data to prove that the electron density is appreciably increased when the 60-90 kms altitude range is illuminated by near ultraviolet light but not by ionizing far ultraviolet radiation. Observations of the variation of auroral-type absorption show, on the contrary, that the photodetachment process does not increase the electron density within that height range by more than 10-20%. All observational results referable to the variation of nondeviative absorption and VLF propagation conditions over short distances during twilight periods may be comprehended in terms of O2 as the primary ion in the lowest ionosphere, provided the height distribution of the ratio of negative ion and electron densities is decreased so that even the night profile has the value 1 at about 60 kms. (Author)

AD-286 294 Div. 2
(TISTP/FR) OTS price $2.60

Kiruna Geophysical Observatory (Sweden).

SUNRISE AND SUNSET EFFECTS ON COSMIC NOISE ABSORPTION ASSOCIATED WITH AURORA AND MAGNETIC STORMS,
by Bengt Hultqvist. 22 Apr 62, 15p. incl. illus. table, 14 refs. (Scientific rept. no. 1)
(Contract AF 61(052)601)
(AFCRL 62-1014)
Unclassified report

DESCRIPTORS: *Extraterrestrial radio waves, *Ionosphere, Absorption, Aurorae, Magnetic storms, Diurnal variations.

The riometer recordings taken at Kiruna during the period September 1958 through 1961 were investigated with respect to variation of auroral-type absorption during twilight periods. The average A sub D/A sub N ratio, i.e., that between post- and pre-twilight absorption at sunrise, and between pre- and post-twilight values at sunset, over the entire period has been found to be 1. 1-1. 2. This value is much lower than that which could be expected (about 3) on the basis of the most recently proposed height distributions of lambda = (negative ion density)/(electron density). It is concluded that the lambda distributions should be decreased so that even the night profile of lambda would have the value 1 at an altitude of about 60 kms. (Author)

AD-286 297 Div. 2, 8
(TISTP/GRW) OTS price $5.60

Midwest Research Inst., Kansas City, Mo.
RESEARCH STUDIES RELATED TO MAPPING, GEODESY AND POSITION DETERMINATION.
Interim technical rept. no. 10, 19 Mar-18 June 61,
by R. S. Brown, J. C. Gravitt and others.
18 June 61, 55p. 17 refs.
(Contract DA 44-009-eng-3769, Proj. 8T35-12-001-01)
Unclassified report

DESCRIPTORS: *Mapping, *Geodesics, Position finding, Electromagnetic waves, Ionospheric propagation, Corrections, Partial differential equations, Bessel functions, Refractive index.

The wave equation describing electromagnetic wave propagation in the troposphere is solved for the one-dimensional medium which has permittivity variations represented in complex-exponential and sinusoidal forms. Form solutions are derived; proper identification of characteristic parameters with the equation being solved permits selection of appropriate solution in terms of Bessel functions or associated Mathieu functions. The wave equation describing electromagnetic wave propagation in the ionosphere is derived for an electron density function that varies only with height. The wave equations are shown to be of the form solved in the tropospheric wave propagation investigations. The remaining equations are shown to have forms considerably more difficult to solve than those solved under tropospheric wave propagations. A review is made of the manufacturer's recommendations for correcting geodetic distance data obtained with the Tellurometer and Geodimeter. The corrections are those due to refractive index of the atmosphere. The effect of decay of refractive index with height on angular deviations of a light ray is worked out for a simple atmospheric model. (Author)

AD-286 298 Div. 2, 8
(TISTP/GRW) OTS price $5.60

Midwest Research Inst., Kansas City, Mo.
RESEARCH STUDIES RELATED TO MAPPING, GEODESY AND POSITION DETERMINATION.
Interim technical rept. no. 11, 19 June-18 Sep 61,
by R. S. Brown, J. C. Gravitt, and B. L. Rhodes.
18 Sep 61, 50p. 11 refs.
(Contract DA 44-009-eng-3769, 8T35-12-001-01)
Unclassified report

DESCRIPTORS: *Mapping, *Geodesics, Electromagnetic waves, Refractive index, Determinants, Propagation, Corrections.

The solution of the wave equation describing electromagnetic wave propagation in the troposphere is considered for a one-dimensional medium having sinusoidal permittivity variations. The wave equation, which has a form similar to Mathieu's equation, is solved using Floquet's theorem. An experiment is described for determining the feasibility of more effective utilization of end-point refractive index parameters in geodetic distance measurements and correction procedures. The experiment utilizes standard equipment for measuring end-point humidity, temperature, and pressure, but utilizes two standard instruments to measure the distance. The experiment would be conducted under a variety of

weather conditions. Methods are presented for analyzing the data for procedures to improve distance measurements. An experiment is described for determining the effect of homogeneous and nonhomogeneous turbulence on the angular deviation and velocity fluctuations of a light beam. Although the experiment is directed at improving the knowledge of tropospheric wave propagation in geodetic measurements, it is designed for laboratory testing where turbulence can be controlled. Both the method of producing and measuring the turbulence and the method of measuring the effect of turbulence on a light beam are described. (Author)

AD-286 299 Div. 2
(TISTP/GRW) OTS price $3.60

Midwest Research Inst., Kansas City, Mo.
RESEARCH STUDIES RELATED TO MAPPING, GEODESY AND POSITION DETERMINATION.
Interim technical rept. no. 13, 19 Dec 61-18 Mar 62,
by R. S. Brown. 18 Mar 62, 30p. 15 refs.
(Contract DA 44-009-eng-3769, Proj. 8T35-12-001-01)
Unclassified report

DESCRIPTORS: *Mapping, *Geodesics, Electromagnetic wave reflections, Refractive index, Wave transmission, Differential equations, Partial differential equations, Propagation.

Methods are discussed by which the index of refraction profile along some path in the atmosphere could be determined through physical measurements made external to the path. In particular, the problem is that of determining the characteristics of a scatterer from the characteristics of the scattered signal. The Schrodinger equation is considered. From a knowledge of the reflection coefficient associated with a wave incident, it is shown how the scattering potential can be calculated. Next, the wave equation is studied. It is shown that the index of refraction profile can be determined from a knowledge of the scattering potential. (Author)

AD-286 300 Div. 2
(TISTP/GRW) OTS price $8.10

Midwest Research Inst., Kansas City, Mo.
RESEARCH STUDIES RELATED TO MAPPING, GEODESY AND POSITION DETERMINATION.
Final technical rept., 19 Sep 60-19 Dec 61,
by R. S. Brown, J. C. Gravitt and others.
19 Dec 61, 82p. incl. illus. 11 refs.
(Contract DA 44-009-eng-3769, Proj. 8T35-12-001-01)
Unclassified report

DESCRIPTORS: *Mapping, *Geodesics, Electromagnetic wave reflections, Refractive index, Differential equations, Ionospheric propagation, Wave transmission, Corrections.

The study of tropospheric wave propagation is concerned with (a) reliability of estimates of accuracy of the distance in geodetic measurements where corrections are made from a knowledge of only end-point atmospheric refractive index values, and (b) solutions of the one-dimensional wave equation for wave propagation in a medium with periodic permittivity variations. The statistical character of the atmospheric refractive index is discussed and estimates of the accuracy of distance correction factors derived. The wave equation for tropospheric wave propagation is compared with Mathieu's equation and solutions derived in terms of both series and Floquet-form solutions. The effect of atmospheric turbulence on the angular deviations and velocity fluctuations of an optical beam are described. These studies are used as a basis for the design of a laboratory experiment to study the accuracy of the theory in predicting angular and velocity fluctuations of a light beam in geodetic position measurements. An experiment is described for determining the feasibility of more effective utilization of end-point refractive index parameters in geodetic distance measurements and correction procedures. (Author)

AD-286 332 Div. 2
(TISTP/GRW) OTS price $2.60

Georgetown Coll. Observatory, Washington, D. C.
RESEARCH DIRECTED TOWARD GEODETIC APPLICATIONS OF ARTIFICIAL SATELLITES.
Final rept.,
by Francis J. Heyden. Nov 61, 17p. incl. illus. tables.
(Contract AF 19(604)4155, Proj. 7600)
(AFCRL 62-888) Unclassified report

DESCRIPTORS: *Satellite vehicle trajectories, *Astronomical cameras, Geodetic data, Test methods, Star trackers, Position finding, Photographic plates, Optical tracking.

Efforts to improve equipment and its application to the reduction of photographic data for geodetic information are described. The problems concerning accurate tracking and identification and film registration are discussed. Three projects were established to derive a simplified technique which would provide accurate positions with available equipment: (1) preparation of tables for proper orientation of a universal type equatorial mounting; (2) adaptation of camera equipment to the telescope mounting, and modification of plateholders; and (3) identification of flare or satellite positions from photographic plates on the celestial sphere. The tests and evaluations of designs and modifications to the equipment are covered, with recommendations for new equipment and re-design features. (Author)

AD-286 372 Div. 2, 15
(TISTP/MS) OTS price $4.60

Ionosphere Research Lab., Pennsylvania State U., University Park.
SUNRISE GEOMETRY AND THE OPTICAL DEPTH FACTOR,
by W. Swider. 1 July 62, 46p. incl. illus. tables, 9 refs. (Scientific rept. no. 164)
(Contract AF 19(604)4563, Proj. 8605 and Grant G-18983)
(AFCRL 62-670) Unclassified report

DESCRIPTORS: *Ionosphere, *Solar energy, *Electrons, *Meteorological data, Vector analysis, Tables, Optical analysis, Earth, Ions, Test methods, Diurnal variations, Geometry, Absorption, Production.

The geometry of the non-refracting ionosphere is considered at sunrise. It is shown that the earth may be considered spherical in regard to ion production at sunrise. An effective method of dealing with the optical depth factor at sunrise is developed. (Author)

AD-286 373 Div. 2, 8
(TISTP/MS) OTS price $8.10

Ionosphere Research Lab., Pennsylvania State U., University Park.
METHODS FOR REDUCING THE BANDWIDTH REQUIRED FOR AN IONOSPHERIC PROBE EXPERIMENT,
by W. H. Hackman. 1 Sep 62, 78p. incl. illus. 22 refs. (Scientific rept. no. 168)
(Contract AF 19(604)8012, Proj. 8605)
(AFCRL 62-1000) Unclassified report

DESCRIPTORS: *Ionosphere, *Ionospheric propagation, *Space probes, *Wave meters, Instru-

mentation, Telemetering, Processing, Electrons, Density, Test methods, Mathematical analysis, Detectors, Circuits, Wave transmission.

Techniques for processing waveforms developed in the IRL probe experiment so that the information content may be transmitted over narrow band telemetry channels are developed. An analysis of the bandwidths required to transmit the unprocessed waveform and output data with two different processing systems in the presence of noise is presented. Experimental results were obtained and are compared with the results of the theoretical analysis. Conclusions show that by means of a simple processing system the bandwidth required could be reduced by a factor of 5 and the rate of data transmission increased by a factor of 6. (Author)

AD-286 444 Div. 2
(TISTP/FR) OTS price $8.10

Massachusetts Inst. of Tech., Cambridge.
STRENGTH OF SATURATED FAT CLAY.
Rept. no. 10 on the Response of Soils to Dynamic Loadings,
by Robert V. Whitman, A. M. Richardson, Jr., and Nasim M. Nasim. June 62, 1v. incl. illus. tables, refs. (Research proj. no. R62-22)
(Contract DA 22-079-eng-224)
Unclassified report

DESCRIPTORS: *Clays, Stresses, Water, Tests.

This report includes:
TESTS AT MODERATE TO RAPID STRAIN-RATES, PART I, by Robert V. Whitman, Archie M. Richardson, Jr., and Nasim M. Nasim. 1962.

TESTS AT SLOW TO MODERATE STRAIN-RATES WITH PORE PRESSURE MEASUREMENTS, PART II, by Robert V. Whitman and Archie M. Richardson, Jr.

Results are presented from two series of undrained triaxial tests upon saturated, remolded specimens, both normally consolidated and heavily overconsolidated, of a fat clay. In the first series, the strain-rate ranged from 1% strain in 5 minutes (t_1 = 5 minutes) to t_1 = 1.5 milliseconds. In the second series, t_1 varied from 1000 minutes to 1 minute, and pore pressures were measured. Both series revealed the importance of internal moisture redistribution in heavily overconsolidated specimens when t_1 exceeds about 1 minute. The excess pore pressure was observed to decrease as the rate-of-strain was increased. The strength increase was on the order of 10% between t_1 = 1000 minutes and 5 minutes, another 10% between t_1 = 5 minutes and one second, and 50% between 1 second and one millisecond. (Author)

AD-286 471 Div. 2
(TISTP/FR) OTS price $5.60

Boeing Scientific Research Labs., Seattle, Wash.
MEASUREMENTS OF LUNAR TEMPERATURE VARIATIONS DURING AN ECLIPSE AND THROUGHOUT A LUNATION,
by Richard W. Shorthill. Aug 62, 19p. illus. 23 refs. (Rept. no. D1-82-0196)
Unclassified report

Also available from the author.

Presented at the Conference on Lunar Exploration on 13-17 August 1962, held at Virginia Polytechnic Institute, Blacksburg, Va.

DESCRIPTORS: *Moon, Temperature, Infrared radiation, Radio waves, Extraterrestrial geography, Periodic variations.

AD-286 481 Div. 2
(TISTA/SEB) OTS price $16.00

Boeing Co., Renton, Wash.
TEMPERATURES FOR WORLD AIR ROUTES AT HEIGHTS OF 10,000, 20,000, 30,000, 40,000 AND 53,000 FEET WITH SUPPLEMENTARY SURFACE TEMPERATURES,
by Raymond M. Wells. Aug 62, 244p. incl. illus. tables (Reviews in Geophysics no. 7; Document no. D6-7177)
Unclassified report

DESCRIPTORS: *Temperature charts, *Flight paths, *Airports, Computers, Mathematical prediction, Global flight, Tables, Temperature.

Seasonal and annual great circle route temperatures in degrees Celsius are computed to 50, 75 and 85% reliabilities of occurrence, i.e. temperatures which are not expected to be exceeded 50, 75 and 85% of the time respectively. The temperatures and their standard deviations are computed over some 2000 selected air routes at the 10,000-, 20,000-, 30,000-, 40,000- and 53,000-foot levels. The great circle distance between terminii is also tabulated. A 7090 was used to compute the route temperatures. Input data for the program consist, for each level, of a grid composed of the mean temperature and its standard deviation at the intersection of each 5 degrees of latitude with each 10 degrees of longitude between 60 degrees S and 60 degrees N and at the intersection of each 5 degrees of latitude with each 20 degrees of longitude south and north of 60 degrees S and 60 degrees N respectively. Supplementary airport surface temperatures are tabulated by month, quarter, half year and year for the 0, 50, 75, 85, 95 and 100% probability of not being exceeded. Lackey's method, adapted for the 7090, was used to compute the surface temperatures. (Author)

AD-286 484 Div. 2
(TISTP/FR) OTS price $3.60

Hawaii Inst. of Geophysics, Honolulu.
A NUMERICAL MODEL OF THE ATMOSPHERIC BOUNDARY LAYER,
by Mariano A. Estoque. July 62, 18p. illus. 10 refs. (Scientific rept. no. 2; Geophysics rept. no. 22)
(Contract AF 19(604)7484, Proj. 8604)
(AFCRL 62-854) Unclassified report

DESCRIPTORS: *Heat transfer, Soils, Atmosphere, Heat, Moisture, Wind, Mathematical analysis.

A physical model was constructed for studying the response of the lowest atmospheric layers and the underlying soil stratum to incoming solar radiation and other external influences. The model consists of three strata: a soil layer, a surface layer in which the vertical fluxes of heat, momentum, and moisture are constant with height, and an overlying transition layer. The dependent variables are the air temperature and moisture, wind, and soil temperature. The equations were integrated to simulate diurnal temperature variations in clear weather with unchanging large-scale synoptic conditions. The results indicate that the model reproduces many important characteristics of the boundary layer. (Author)

AD-286 584 Div. 2
(TISTW/PCR) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE DETERMINATION OF METEOR RADIANTS BY THE

METHOD OF SUSTAINED OSCILLATIONS,
by G. V. Avraamova. 24 Aug 62, 9p. incl. illus. tables (Trans. no. FTD-TT-62-591 from Trudy Odesskogo Gosudarstvennogo Universiteta im. I. I. Mechnikova 149: pp. 31-36, 1959)
Unclassified report

DESCRIPTORS: *Meteors, Oscillations, Direction finding, Range finding, Electronic equipment, Equations, Mathematical analysis, USSR, Position finding.

AD-286 617 Div. 2, 25, 6
(TISTE/JBM) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A RADIO TELESCOPE WITH AUTOMATIC CONTROL OF THE REFLECTOR SURFACE,
by A. G. Sokolov. 18 Sep 62, 4p. incl. illus. (Trans. no. FTD-TT-62-1121 from Soviet Patent No. 142702 (671627/26) 27 June 1960)
Unclassified report

DESCRIPTORS: *Radio astronomy, *Telescopes, USSR, Translations, Reflection, Reflectors, Automatic, Control systems, Photoelectric cells, Focusing, Lenses, Telescope lenses, Telescope mounts, Light, Sources.

A description is given of a radio telescope with automatic control of the reflector surface, which consists of moving shields located on the supporting structures of the telescope. The positions of the moving shields, are corrected by directing a source of light beams, with the aid of lenses, towards fixed points of the theoretical surface of the radio telescope, on which are mounted photocells which switch on a shifting mechanism when the surface is distorted. (Author)

AD-286 619 Div. 2
(TISTP/FR) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE STUDY OF THE EARTH'S ATMOSPHERE AND OF COSMIC SPACE WITH THE HELP OF SOVIET COSMIC ROCKETS AND ARTIFICIAL SATELLITES,
by Edmond Nicolau. 12 Sept 62, 15p. incl. illus. 10 refs. (Trans. no. FTD-TT-62-464 from Telecomunicatii No. 1, pp. 20-25, 1960)
Unclassified report

DESCRIPTORS: *Ionosphere, Van Allen radiation belt, Satellite vehicles.

AD-286 620 Div. 2, 6
(TISTP/GRW) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE QUESTION OF PROCESSING RADAR OBSERVATIONS OF METEORIC ECHOS,
by V. P. Tsesevich. 27 Aug 62, 20p. incl. tables. (Trans. no. FTD-TT 62-595 from Trudy Odesskogo Gosudarstvennogo Universiteta im. I. I. Mechnikova 149:9-23, 1959)
Unclassified report

DESCRIPTORS: *Meteors, *Radar echo areas, Flight paths, Intensity, Periodic variations, Classification, Radar analysis.

AD-286 637 Div. 2
(TISTP/FR) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
CLASSIFICATION OF LANDSCAPE GEOMETRY FOR MILITARY PURPOSES,
by Charles R. Kolb. 1962, 13p. incl. illus.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Terrain, Deserts, Classification.

A method of classifying landscape based on relief, slope, slope occurrence, and plan-profile is presented. The interrelation of these parameters in landscape definition, modification in definition due to scale difference, and synthesis of these parameters in a single semiquantitative landscape symbolization are discussed. Landscape geometry classification is limited to terrain exhibiting more than 10 ft of relief. Terrain features exhibiting less than 10 ft of relief are classified as surface roughness or microrelief. The goal has been to develop as complete a landscape geometry definition as possible within as simple a framework as possible. (Author)

AD-286 669 Div. 2
(TISTP/GRW) OTS price $6.60

Deutscher Wetterdienst, Frankfurt (Germany).
ATTEMPT TO ESTABLISH AN ATMOSPHERIC MODEL OF THE NONTROPICAL LATITUDES ON THE BASIS OF SIMPLE SUPPOSITIONS.
Final rept. on Cell Structure of the Atmosphere,
by Heinrich Faust and Walter Attmannspacher.
May 62, 59p. incl. illus. tables.
(Contract DA 91-591-EUC-1668)
Unclassified report

DESCRIPTORS: *Atmosphere models, Standards, Meteorological data, Boundary layer, Heating.

Contents:
The Earth's Surface as Heating Level
The Upper Boundary of the Ozone Layer as Heating Level
The Joint Action of the Two Heating Levels

AD-286 737 Div. 2
(TISTP/GRW) OTS price $1.60

Travelers Research Center, Inc., Hartford, Conn.
RELATIONSHIPS BETWEEN TROPICAL PRECIPITATION AND KINEMATIC CLOUD MODELS.
Quarterly progress rept. no. 1, 1 May-31 July 62,
by Edwin Kessler, III and Edward A. Newburg.
31 July 62, 16p. incl. illus. 9 refs. (Rept. no. 7048-38)
(Contract DA 36-039-sc-89099, Proj. no. 3A 99-27-005)
Unclassified report

DESCRIPTORS: *Atmosphere models, *Precipitation, Clouds, Partial differential equations, Tropical regions, Convection.

During May, June, and July, 1962, previously unpublished material was collected, organized, and submitted to the Monthly Weather Review under the title Elementary Theory of Associations between Atmospheric Motions and Distributions of Water Content. Also, a theory of the relationships among cloud, precipitation, vapor, and air motions, which includes a quantitative modeling of the bulk effects of many processes of cloud and precipitation physics, was completed. The theory is formulated in two continuity equations that describe the development of vapor, cloud, and precipitation distribution when initial and boundary conditions and the wind field are prescribed. (Author)

AD-286 773 Div. 2
(TISTP/GRW) OTS price $7.60

Hydraulic Engineering Lab., U. of Calif., Berkeley.
BEACHES IN NORTHWESTERN CALIFORNIA,

by David T. Snow. Aug 62, 74p. incl. illus. tables, refs. (Series no. 14, Issue no. 25)
(Contract DA 49-055-eng-8)
Unclassified report

DESCRIPTORS: *Beaches, Sampling, Classification, Sedimentation, Tables, Statistical analysis, California.

Forty-two stations on the beaches and coastal streams between the Oregon boundary and Bodega Head, California, were sampled from one to four times each in the years of 1958 to 1960. Grain size and sorting parameters from single samples proved adequate to distinguish the character of one beach from another, but single samples do not show significant changes with time at individual localities. Groups of stations having sands that are not significantly different, on the basis of single samples, usually fall within the boundaries of geographic units as well. There are very few exceptions to these geographical groupings, but the sands at a given locality can seldom be reconciled with the existing wave exposure, thus beach character must reflect other causes, such as source. (Author)

AD-286 805 Div. 2
(TISTP/GRW) OTS price $5.60

Weather Forecasting Research Center, U. of Chicago, Ill.
AERIAL RECONNAISSANCE OF THE LARGE-SCALE CLOUD STRUCTURE OF WINTERTIME CYCLONES CASE I - DECEMBER 11, 1960,
by E. Paul McClain and Yukio Omoto. July 62, 51p. incl. illus. 16 refs. (Scientific rept. no. 8)
(Contract AF 19(604)7230, Proj. 8641)
(AFCRL 62-849) Unclassified report

DESCRIPTORS: *Clouds, *Aerial reconnaissance, *Storms, Cyclones, Air mass analysis, Climatic factors.

Results of the first of five detailed case studies of the large-scale cloud structure of wintertime cyclones in the eastern half of the United States are presented. The investigations emphasize the use of special0collections of pilot reports, and an unusual three-dimensional representation of the cloud layers is developed for illustrating the results. The principal features of the cloud structure, some of which depart from the familiar Bergeron models, are as follows: (1) widespread areas of low cloudiness extending from far south in the warm sector across the warm front and thence westward far into the cold air; (2) an extensive cirrostratus shield over most of the storm area and largely detached from lower cloud masses; (3) complex layering of the main cloud mass, even in parts of the main precipitation area; a marked tongue of cloud-free air in the lower troposphere that extends from the south-west through the storm center. These characteristics of the cloud structure are generally well supported by the dew-point depression, vertical motion and precipitation patterns. (Author)

AD-286 807 Div. 2, 15
(TISTP/TL) OTS price $3.60

California U., Los Angeles.
THE PROPAGATION OF ERROR IN NUMERICAL INTEGRATION OF THE DISCRETE VORTICITY EQUATION,
by W. Lawrence Gates. 15 May 62, 34p. incl. illus. tables, 3 refs. (Scientific rept. no. 6)
(Contract AF 19(604)6149, Proj. 8628)
(AFCRL 62-493) Unclassified report

DESCRIPTORS: *Weather forecasting, *Vortices, *Equations, Numerical analysis, *Integration, *Errors, Integral transforms, Statistical distributions, Difference equations, Series, Statistical functions, Mathematical prediction.

By use of a discrete analogue of the finite Fourier transform, an implicit form of the linear difference barotropic vorticity equation is solved for arbitrary discrete initial data. This solution is applied to the problem of the spread of an initially isolated discrete error, representing either a round-off, observational, or other local numerical error. Of the complete spectrum of discrete error components present, the shorter wave components move outward in a dispersive fashion with an error wave of approximately 4 delta x length moving most rapidly, while the longer error components of length greater than 9 delta x move upstream, where delta x is the space mesh size. Such propagating error fields appear to be characteristic of a discrete system in response to a broad initial error spectrum, as with an abrupt jump or isolated erroneous value. As time progresses the error distribution appears whiter, although the root-mean-square error remains at approximately 5% of the original isolated error in the case N equals L/delta equals 36. After 240 (1 hr) time steps, only an occasional local error reaches 40% of the original value. (Author)

AD-286 853 Div. 2, 12
(TISTP/MS) OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
SATELLITE MEASUREMENT PROGRAM TO DETERMINE OZONE CONCENTRATION AND ALBEDO IN THE NEAR ULTRAVIOLET. Semiannual technical note, 1 Jan-30 June 62,
by E. B. Mayfield and R. M. Friedman. 30 Aug 62, 9p. incl. illus. (Rept. no. TDR-69(2260-50)TN-2)
(Contract AF 04(695)69)
(DCAS TDR 62-178) Unclassified report

DESCRIPTORS: *Meteorological data, *Satellites, *Ozone, *Ultraviolet radiation, Radiometers, Test methods, High altitude, Distribution, Upper atmosphere, Measurement.

A flight experiment was prepared which utilizes a radiometer mounted on an Agena satellite to determine the worldwide distribution of ozone at high altitudes and the ultraviolet albedo in the atmosphere by measuring the transmission and reflection of sunlight at 2550 A. Previous experiments have measured only local concentrations by using radiometers mounted on rocket probes or by measuring sunlight reflected from the Echo satellite. The experimental equipment used and the methods employed to obtain these measurements are discussed in detail. History of the first flight is recorded. A short discussion of the theoretical work is included. (Author)

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

AD-286 043 Div. 3
(TISTB/SAT) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
EFFECTS OF MUSTARD GAS ON T2 BACTERIOPHAGE AND DNA SYNTHESIS,
by B. Papirmeister. 1962, 19p. incl. illus. tables, 32 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, United States Military Academy, West Point, New York.

DESCRIPTORS: *Mustard gas, *Bacteriophages, *Cancer, Nucleic acids, Mutations, Culture media, Escherichia, Metabolism inhibitors, Chemotherapeutic agents.

The reaction of only a few molecules of H with T2 bacteriophage both in vitro and in vivo causes the virus to rapidly lose its ability to reproduce and to initiate viral DNA synthesis. Most of the lethal reactions are localized in the genetic material (DNA). It is suggested that DNA replication and function may have similar sensitivities to the agent. The effect of H on the in vitro synthesis of DNA was also investigated. The only component of the reaction significantly affected by H is the DNA primer. Although DNA synthesis eventually recovered when H-treated primer and purified polymerase are employed, considerably less recovery took place with H-treated primer and impure preparations of polymerase. Secondary degradation of DNA was also observed with H-treated E. coli. It is suggested that the nuclease-mediated, secondary degradation of H-damaged DNA is responsible for a large segment of the H-toxicity to cells. (Author)

AD-286 432 Div. 3
(TISTB/SAT) OTS price $2.60

Armour Research Foundation, Chicago, Ill.
STERILIZATION OF SEWAGE CONTAINING PATHOGENIC MICROORGANISMS. NUCLEAR REACTOR.
Addendum to rept. no. 9, Phase I rev.
5 May 56, 1v. (Addendum to AD-286 430)
(Contract DA 18-064-404-93)
Unclassified report

DESCRIPTORS: *Biological warfare agents, *Infections, *Sewage, Thorium, Heat exchangers, Boiling water reactors, Gamma rays, Decontamination.

AD-286 448 Div. 3
(TISTW/JRG) OTS price $1.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
EFFECTS OF CASE COATING ON LOADING AND BURNING CHARACTERISTICS OF EXPERIMENTAL ILLUMINANTS FOR XM-145 AND XM-146 GROUND SIGNALS,
by Joseph Kristal and Burton Werbel. Oct 62, 17p. incl. tables (Technical memo. no. 1083)
(Proj. 504-22-016)
Unclassified report

DESCRIPTORS: *Flares, *Colored flares, *Pyrotechnics, *Coatings, Signals, Colors, Loading, Tests, Waxes, Plastics, Graphite, Illumination, Combustion.

Static performance tests were conducted on flare compositions producing red and yellow light, using convolute-wound filter paper cases with the XM-146 yellow light systems and convolute-wound kraft paper with the red light XM-145 systems. These cases were 3.83 in. long and had an inner diam of 1.19 in. Results were compared on the basis of the decisive parameters of ignition characteristics, candlepower, burning time, and ease of loading. Polywax (67/33), polywax (80/20), Thiokol, Coast Pro-Seal, and graphite were investigated as case coatings. Candlepower was found to depend on the type of case coating used and the temperature range to which the coated cases were subjected. Burning time was found to be generally independent of factors which affected candlepower. No case coating investigated met all requirements. Slag formation and/or chimney formation, possibly caused by case material or case coating or both, could have been responsible for occasional severe reductions in candlepower. (Author)

AD-286 636 Div. 3
(TISTB/SAT) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
EVIDENCE THAT RHESUS MONKEYS DIE FROM ANTHRAX TOXIN,
by F. Klein, D. R. Hodges and others. 1962, 12p. incl. illus. tables, 11 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Bacterial toxins, *Bacillus anthracis, Anthrax, Primates, Lymph, Blood, Cannulation, Antitoxins, Bacteremia.

Evidence that a toxin produced by B. anthracis causes death in animals has been extant since as early as 1931. Recognition of these evidence and their reverification have been left until this decade, when Smith et al. (1955) and later workers demonstrated that the terminal shock from toxin is the major cause of death in anthrax. In this paper evidence is presented that: (1) Anthrax toxin can be demonstrated in body fluids of the Rhesus monkey at death. (2) Anthrax toxin is present in increasing amounts in body fluids of Rhesus monkey dying of anthrax. (3) In vitro produced, sterile anthrax toxin is capable of causing the death of Rhesus monkey. (4) Anthrax antiserum protects the Rhesus monkey against in vitro toxin produced by B. anthracis. These findings imply that the treatment of the disease in man should be revised to include use of antitoxin for neutralization effects. (Author)

AD-286 644 Div. 3
(TISTB/SAT) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
LIVE AND KILLED TULAREMIA VACCINES: EVALUATION IN ANIMALS AND MAN,
by H. T. Eigelsbach, W. D. Tigertt and others. 1962, 14p. incl. illus. tables.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Tularemia vaccine, *Immunization, *Atomization, Bacterial aerosols, Pasteurella, Streptomycin, Aureomycin, Primates, Man, Effectiveness.

After extensive studies in monkeys, an evaluation of tularemia vaccine prophylaxis was made in man. It was determined that clinical tularemia could be produced in voltunteers by intracutaneous inoculation or inhalation of approximately 10 organisms of Pasteurella tularensis SCHU S4. The disease in either case responded promptly to specific antibiotic therapy. The Foshay phenolized (killed) tularemia vaccine afforded volunteers increased ability to combat the disease produced by a small intracutaneous inoculum but did not result in even low-grade immunity to a small respiratory challenge. A live tularemia vaccine produced at Fort Detrick was proved innocuous for man and afforded volunteers high-grade immunity against respiratory infection for at least 1 year after vaccination. Aerogenic vaccination of volunteers with 1,500 to 30,000 organisms of aerosolized live vaccine was not associated with clinically discernible reaction and the agglutinin response was as good as in volunteers vaccinated dermally. Aerosolized live tularemia vaccine has potential use in mass aerogenic vaccination and as a simulant agent for field tests of biological weapons. (Author)

4. CHEMISTRY

AD-285 649 Div. 4, 25
(TISTM/TCG) OTS price $1.60

Rensselaer Polytechnic Inst., Troy, N. Y.
HIGH TEMPERATURE HEAT CONTENT AND RELATED PROPERTIES FOR Li_2CO_3, Na_2CO_3, K_2CO_3, AND THE TERNARY EUTECTIC MIXTURE,
by G. J. Janz, E. Neuenschwander and F. J. Kelly. Sep 62, 8p. illus. tables, 11 refs. (Technical rept. no. 15)
(Contract Nonr-59110)
Unclassified report

DESCRIPTORS: *Lithium compounds, *Sodium compounds, *Potassium compounds, *Carbonates, *Enthalpy, High temperature research, Heat of fusion, Specific heat, Entropy, Thermodynamics, Eutectics, Mixtures.

The enthalpy changes between temperatures ranging from 275 to 975 and 25 C were determined by drop calorimetry. Heats of fusion (kcal/mole) thus determined are: Li_2CO_3, 10.7; Na_2CO_3, 6.7; K_2CO_3, 6.6; ternary eutectic, 6.6. Entropies of fusion and specific heats are likewise reported. For the ternary eutectic the heat of mixing and the excess entropy of mixing are, respectively, -0.8 kcal/mole and 1.3 eu. The thermodynamic relations are discussed. It is apparent that positional randomization is insufficient to account for the fusion process of these carbonates. (Author)

AD-285 672 Div. 4, 25
(TISTM/TCG) OTS price $1.10

Guggenheim Jet Propulsion Center, Calif. Inst. of Tech., Pasadena.
PRELIMINARY ABSOLUTE INTENSITY MEASUREMENTS FOR THE 1.38, 1.87 AND 2.7 MICRON BANDS OF WATER VAPOR BETWEEN 125 AND 200 C,
by R. Goldstein. Aug 62, 3p. illus. 4 refs. (Technical rept. no. 42)
(Contract Nonr-22045, Proj. NR 015 401)
Unclassified report

DESCRIPTORS: *Water vapor, *Intensity, Pressure, Absorption, Spectrographic analysis.

The absolute intensities of the 1.38, 1.87 and 2.7 micro bands of water vapor were measured in a stainless steel (variable spacer) absorption cell with sapphire windows using self-broadening. A reservoir containing liquid water was used to fill the cell with water vapor. Pressures of 2.29 to 15.34 atm, corresponding to temperatures of 125 to 200 C and optical depths from 0.348 to 29.18 cm-atm, were used. (Author)

AD-285 699 Div. 4
(TISTM/ODN) OTS price $1.60

Electro-Optical Systems, Inc., Pasadena, Calif.
ELECTROCHEMICAL TECHNIQUES AS APPLIED TO THE DIECKMANN CONDENSATION.
Final rept.,
by S. M. Lee. Oct 62, 10p. incl. illus. table. (Rept. no. 2260-F)
(Contract DA 18-108-cml-7059)
Unclassified report

DESCRIPTORS: *Electrochemistry, *Condensation reactions, Carbonyl radicals, Methyl radicals, Piperidines, Cyclopentanones, Ethyl radicals, Alkoxy radicals, Electric potential.

Efforts to affect a direct electrolytic Dieckmann-like condensation with 1-carboethoxymethyl-4-carbomethoxypiperidine as the starting compound were unsuccessful. The reaction variables investigated in connection with this proposed transformation included anodic potential and current density, medium, membrane and temperature. The only materials isolated by the principal investigator had a crude, viscous consistency. The early attempts at electrically converting diethyl adipate to 2-carboethoxycyclopentanone yielded only 4 percent of a viscous, unidentifiable material. In later experiments the product 'work up' procedure was modified and almost quantitative material balances were obtained. However, even under the most drastic conditions as much as 80% of the starting material was isolatable. No experimental evidence was uncovered to support directly or indirectly the concept of an electrolytic intramolecular Dieckmann or an intermolecular Claisen-type condensation taking place. (Author)

AD-286 042 Div. 4
(TISTM/SJR) OTS price $1.10

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
PARTIALLY FLUORINATED ALIPHATIC COMPOUNDS BY REDUCTIVE DESULFURIZATION OF SUBSTITUTED THIOPHENE,
by S. Portnoy and H. Gisser. 1962, 3p. refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, United States Military Academy, West Point, New York.

DESCRIPTORS: *Fluorides, *Thiophenes, *Sulfur compounds, Synthesis, Grignard reactions, Infrared spectroscopy, Octenes, Alcohols, Fluids, Stability, Heat, Condensation reactions.

The preparation of partially fluorinated organic compounds via reductive desulfurization of appropriately substituted thiophene was investigated. Condensation of a fluoro acid chloride with a thienyl halide was accomplished by a reverse Grignard procedure. Conventional acid condensation techniques did not work. The resulting compound was desulfurized with Raney nickel yielding the aliphatic alcohol and ketone. The alcohol was dehydrated to the olefin and then hydrogenated to the saturated hydrocarbon. The Wolff-Kischner and Clemmensen reduction of the fluorinated ketone were unsuccessful. (Author)

AD-286 054 Div. 4, 22
(TISTM/EJH) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
THERMAL DECOMPOSITION OF LEAD AZIDE IN VARIOUS ENVIRONMENTS,
by Bruno Reitzner, James E. Abel and J. V. Richard Kaufman. 1962, 11p. incl. illus. 9 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Lead compounds, *Azides, *Decomposition, *Explosives, Air, Oxygen, Nitrogen, Water vapor, Iodine, Controlled atmospheres, Silver, Lead, Vacuum apparatus, Reaction kinetics, Chemical reactions, Catalysis, Ignition, Hydrolysis.

Experiments on the thermal decomposition of lead azide in vacuum and various atmospheres con-

sisting of or containing air, oxygen, nitrogen, water or iodine vapor are described. Gases which are capable of reacting with the lead nuclei formed during the decomposition have the effect of increasing the induction period of the autocatalytic reaction or even suppressing this type of reaction completely. In the presence of water vapor a hydrolysis reaction mechanism. Iodine vapor not only affects the lead nuclei, but also the azide group. On the other hand the thermal decomposition of lead azide is enhanced by the addition of silver. Similar environmental effects are observed when lead azide is detonated in air, vacuum or in admixture with silver. (Author)

AD-286 058 Div. 4, 20, 25
(TISTM/MSH) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
EFFECT OF IONIZING RADIATION ON PYRIDINE,
by C. Pearce. 1962, 13p. incl. illus. 11 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962 at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Pyridines, *Radiation effects, Gamma rays, Chromatographic analysis, Ultraviolet spectroscopy.

Pyridine, like benzene, has the resonating pi-electron structure identified with aromatic compounds. Polar contributions due to the nitrogen atom in the pyridine ring are also present. Gamma irradiation (2.5 x 10 to the 22nd power ev/1 or 2.7 x 10 to the 5th power roentgens) of pure dried, oxygen-free, liquid pyridine resulted in negligible gas yields, but in measurable amounts of non-gaseous products. Analysis of these products by gas chromatography and ultraviolet absorption spectroscopy revealed the formation of 2,2'-bipyridine, 2,x'-bipyridine (either or both 2,3'-and 2,4'-bipyridine), and approximately an equal amount of an unidentified product. The total yield of a non-gaseous product from pyridine approximates that for benzene, demonstrating that pyridine behaves essentially as an aromatic when irradiated, and is relatively stable to radiation. The contribution of the presence of the N-atom is noted in the bipyridine isomers formed, and in the distribution of products. The bipyridine fraction of the total product is much greater than the biphenyl fraction from benzene. As an aromatic compound, but one that is easily compatible with both organic and inorganic compounds, we anticipate that the pyridine molecule may be incorporated in systems where radiation protection or stability is desired. A mechanism based on the formation of free radicals is presented for the chemical effects of radiation on pyridine.

AD-286 160 Div. 4, 15
(TISTM/SJR) OTS price $10.10

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
THE OPTIMAL CONTROL OF CHEMICAL PROCESSES,
by Coleman B. Brosilow. 3 July 62, 122p. incl. illus. 13 refs. (Research rept. no. PIBMRI-1023-62)
(Contract AF 18(600)1505)
(AFOSR-2898) Unclassified report

DESCRIPTORS: *Chemical engineering, *Servo systems, Servomechanisms, Control systems, Manufacturing methods, Analog computers, Chemical industry, Mathematical analysis.

Attention is focused on obtaining a near optimal controller, for chemical processes, which is simple to design and inexpensive to implement. Pontryagin's technique is used to show that for a quadratic objective function, and a process which is described by a set of ordinary differential equations, linear in the controllable variables, the optimal control is on-off control, when the controllable variables are assumed to be bounded. A technique of parameter optimization is developed and used to obtain the equations which specify the switching times. These equations are restricted to processes which can be approximated by stable, linear, stationary differential equations. For the special case of one switch it is shown that the control law can be transformed into a switching criterion which is linear in the process outputs. Employing this criterion continuously results in a feedback controller which requires only a relay and a summing device for implementation. Analog computer studies on the control of both underdamped and overdamped systems with the 'one switch into the future' optimal controller show that this controller gives a virtually dead beat type of response even for severe disturbances. (Author)

AD-286 343 Div. 4, 25
(TISTM/TCG) OTS price $1.10

Cincinnati U., Ohio.
(No title).
Final rept.,
by H. H. Jaffe. 1 Oct 62, 4p.
(Contract DA 33-008-ORD-1155 and Grand DA-ARO(D)-31-124-G59) Unclassified report

DESCRIPTORS: *Organic compounds, *Azo radicals, *Benzenes, *Reaction kinetics, Chemical reactions, Chemical bonds, Atomic orbitals, Molecular spectroscopy, Thermochemistry, Molecular structure, Theory, Acid-base equilibrium.

AD-286 425 Div. 4, 7
(TISTM/TCG) OTS price $5.60

Aeronautical Research Lab., Office of Aerospace Research, Wright-Patterson Air Force Base, Ohio.
SURFACE PROPERTIES OF METALS BY POLARIZATION CAPACITANCE MEASUREMENTS.
Report on Surface and Interface Phenomena of Matter,
by A. B. Johnson. July 62, 46p. incl. illus. tables, 31 refs. (Rept. no. ARL 62-376)
(Proj. 7022)
Unclassified report

DESCRIPTORS: *Metals, *Surface properties, *Polarization, Capacitance bridges, Electrolytes, Electrodes, Temperature, Mercury, Gold, Platinum, Cleaning, Thin films, Oxides, Foils, Electrical properties.

Polarization capacitance is discussed as a method to determine surface properties of metals, with emphasis on surface roughness factors. Complications in the use of polarization capacitance to determine absolute roughness factors by the mercury comparison method are presented. Complicating factors include oxide films, solution impurities and changes in capacitance with potential. Measurement of relative roughness factors from capacitance data is therefore considered to be a more reliable and widely applicable approach. Polarization capacitances of Au foil electrodes were measured. Effects of temperature and surface treatment are reported. Transient effects were observed after electrodes were cleaned by flaming, sparking and chromic acid dips. Relative roughness factors were measured for abraded Au and Pt electrodes, using smooth

samples of the respective metals as reference surfaces. Values for Au were 2.2 to 2.3 and 2.8 to 3.1 depending on the size of abrasive. For Pt, a value of 2.7 was observed. The values compare favorably with roughness factors determined for other abraded metals. (Author)

AD-286 472 Div. 4, 7, 25
(TISTM/MSH) OTS price $11.50

Baylor U., Waco, Tex.
THE MECHANISM OF OXIDATION OF LOW MOLECULAR WEIGHT ORGANIC COMPOUNDS AT PLATINUM ELECTRODES IN AQUEOUS SOLUTIONS,
by Thomas C. Franklin and Charles Liang. Aug 62, 146p. incl. illus. tables, refs. (Scientific rept. no. 2)
(Contract AF 19(604)8414, Proj. 6694)
(AFCRL 62-872) Unclassified report

DESCRIPTORS: *Organic compounds, *Electrochemistry, *Oxidation, *Reaction kinetics, Electrodes, Platinum, Hydroxides, Methanols, Ethanols, Formaldehyde, Formic acid, Propanols, Molecular weight, Fuel cells, Potentiometers, Adsorption.

Electrode processes for the oxidation of some low molecular weight organic compounds at platinum electrodes in 2N sulfuric acid and 2N sodium hydroxide solutions were studied. Cyclic voltammetry, chronopotentiometry, potential decay, and controlled potential oxidation were used. A new method for studying the kinetic order of electrode reactions was used. At low organic-compound concentrations, the rate of electrolytic oxidation of the organic compound is first order with respect to the concentration of the organic compound and first order with respect to the surface area of the electrode; at higher concentrations, an equilibrium reaction is observed. It was concluded that this equilibrium reaction is adsorption of the organic molecules on the platinum electrode and that adsorption is the rate-determining step of the oxidation reaction. (Author)

AD-286 629 Div. 4, 14
(TISTM/SJR) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PHOSPHORUS-CONTAINING POLYMERS. III. APPLICATION OF THE ARBUZOV REACTION FOR POLYMERIZATION OF ETHYLENE ALKYL PHOSPHITES,
by K. A. Petrov, E. Ye. Nifant'ev and others. 16 Aug 62, 7p. incl. tables, 5 refs. (Trans. FTD-TT-62-1058 from Vysokomolekulyarnyye Seyedineniya 4:2, pp. 246-249, 1962)
Unclassified report

DESCRIPTORS: *Phosphorus compounds, *Phosphonic acids, Esters, Phosphites, Catalysts, Iodides, Methyl radicals, Molecular weight, Plasticizers, Lubricant additives, USSR, Polymerization, Synthesis.

Polyphosphonates were synthesized from ethylene alkyl phosphites in the presence of catalytic amounts of methyl iodide. The polyphosphonate structure was demonstrated by cleaving the reaction product of ethylene heptyl phosphite with phosphorus pentachloride. The polymers may possibly be used as plasticizers or lubricant additives. (Author)

AD-286 635 Div. 4, 2
(TISTP/FR) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
LABORATORY STUDIES OF UPPER ATMOSPHERE CHEMICAL REACTIONS,
by Frederick Kaufman and John R. Kelso. 1962, 12p. incl. illus. tables, 19 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Chemical reactions, *Recombination reactions, Gas discharges, Upper atmosphere, Oxygen, Nitrogen compounds, Oxides, Ozone.

A laboratory research program is described which deals with measurements of the rates of oxygen and nitrogen atom reactions and which clarifies the origin and mechanism of associated afterglows. O- and N-atoms are generated in microwave gas discharges, mixed with other reactant or diluent gases, and pumped through a flow tube under steady-state conditions. The nature of the air afterglow, nitrogen afterglow, and blue nitric oxide afterglow are discussed, and new results are presented on the effect of five diluent gases on the rate of the light-producing process of the air afterglow. The efficiency of these diluents as third bodies in the recombination reaction O + NO + M yields NO2 + M is also determined. New experiments on the intermolecular recombination of O with O2 to form ozone yield a lower rate constant than is currently quoted in the literature. Further work on this important reaction is outlined which will help explain the composition of the upper atmosphere. (Author)

AD-286 653 Div. 4
(TISTM/TCG) OTS price $1.10

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
ORGANOMETALLIC RESEARCH USING GROUP IV ELEMENTS,
by Malcolm C. Henry, Jan G. Noltes and others. 1962, 8p. incl. illus. 13 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Metalorganic compounds, *Hydrides, *Chemical reactions, Ethylenes, Acetylenes, Chemical bonds, Sulfur compounds, Germanium compounds, Lead compounds, Thio radicals, Esters, Sulfides, Metals, Carbon, Synthesis.

Syntheses of some organometallic hydrides and their subsequent reactions, e.g., addition to olefinic and acetylenic linkages, were investigated. These reactions allow a general method of synthesizing organometallic IV group compounds containing a variety of reactive functional groups. As the result of a new chemical moiety, some novel organolead and germanium compounds involving both metal-carbon bonds and metal-sulphur bonds were produced. Simple sulphides, di- and trisulphides and thioester substituents were attached directly to the elements of Ge and Pb. The synthesis of R3M-S-Na, the sodium salt of a trisubstituted metal mercaptan, and the reactions to be realized from this type of molecule are specifically described. Parallel investigations resulted in the synthesis of a new type of organometallic compound containing both Pb and As. These organolead arsonates show suprising chemical stability and their synthesis shows some interesting reactions. (Author)

AD-286 672 Div. 4, 25
(TISTM/ODN) OTS price $6.60

Oslo U. (Norway).
ON THE COMPOSITION, STRUCTURE AND MAGNETIC PROPERTIES OF SOME URANIUM CHALCOGENIDES.
Technical rept.,
by F. Gronvold, H. Haraldsen and others.
31 Mar 62, 63p. incl. illus. tables, 45 refs.
(Contract AF 61(052)178)
(ARL 62-427, pt. 2) Unclassified report

DESCRIPTORS: *Uranium compounds, *Sulfides, *Selenides, *Tellurides, Molecular structures, Magnetic properties, Magnetic susceptibility, Synthesis, Lattices, Bibliography, Crystal structure.

Uranium sulfides in the range US1.5 to US3.1 have been prepared from high purity elements at temperatures up to 1400 C. The most U-rich phase obtained in the pure state was the earlier described U3S5. It has an orthorhombic structure. The unit cell is primitive and probably contains 12 U and 20 S atoms. At the stoichiometric composition US2 only the orthorhombic structure was observed, even after quenching from 1400 C or heat treatment for one month at 400-410 C. A two-phase region is observed from US2.1 to US2.9 with US3 as the most S-rich phase. The most U-rich selenide prepared by heating the elements to 1000 C was the U3Se5-phase. In agreement with earlier results its structure is of the same type as U3S5. At higher Se contents the USe1.9-phase, isotypic with US1.9 and with variable composition is encountered. The only phase richer in Se than USe1.9 found in this study was the USe3-phase. Magnetic measurements of the sulfides US1.6, US1.9, US2 and US3, and the selenides USe2 and USe3 were carried out by the Gouy method at temperatures from -183 to 445 C. (Author)

AD-286 718 Div. 4
(TISTM/SJR) OTS price $1.60

Minnesota U. School of Chemistry, Minneapolis.
THE EFFECT OF STRUCTURE ON MERCAPTAN DISSOCIATION CONSTANTS.
by Maurice M. Kreevoy, Bruce Eichinger and others. 1962, 13p. incl. tables.
(Contract DA 49-193-md-2027)
Unclassified report

DESCRIPTORS: *Thiols, Measurement, Resonance, Molecular structure, Synthesis, Acetic acids, Atomic orbitals, Phenols, Pyridines, Propionic acids, Propanols, Methyl radicals, Butyl radicals, Pentanes, Dissociation.

Acid dissociation constants (KA) were determined for thioacetic acid and various mercaptans. Some of the compounds were synthesized as part of the research. A linear relationship between KA and induction effects was found for non-conjugated mercaptans. This is cited as evidence against a Baker-Nathan effect.

AD-286 829 Div. 4, 25
(TISTM/TCG) OTS price $2.25

Westinghouse Electric Corp., Pittsburgh, Pa.
ELECTROLUMINESCENT-PHOTOCONDUCTOR ELEMENTS.
Final rept., 1 Mar 61-28 Feb 62,
by P. N. Wolfe, J. E. Johnson, and W. J. Harper.
Aug 62, 87p. incl. illus. tables, 50 refs.
(Rept. no. 62-961-45522-R1)
(Contract AF 33(616)8020, Proj. 1610-7062)
(ASD TDR 62-533) Unclassified report

DESCRIPTORS: *Photoconductivity, *Luminescence, *Cadmium compounds, *Sulfides, Luminescent materials, Thin films, Photoelectric effect, Single crystals, Growth, Pulse modulation, Evaporation, Absorption, Infrared photoconductors, Photoelectric materials, Photoelectric cells.

A materials improvement program was undertaken. Electroluminescence studies were concentrated on dc-pulse-excited thin film electroluminors, whose relevant properties such as response speed, quantum efficiency, spectral output, temperature dependence, and maintenance are summarized. Research on photoconductors was concerned with preparation techniques for high-purity single crystals and evaporated films of cadmium sulfide, and with performance improvements attainable in single crystals by optimizing trap distributions. It was concluded that the desired logic element speed is not likely to be attained with simple, two-terminal electroluminors and photoconductors, but rather will require the use of devices incorporating additional gain, possibly three-terminal electroluminors. (Author)

AD-286 870 Div. 4
(TISTM/SJR) OTS price $3.60

California U., Los Angeles.
IONIC ASSOCIATION IN AQUEOUS SOLUTIONS OF THIONINE.
Final rept.,
by G. R. Haugen and E. R. Hardwick. 30 Apr 62,
28p. incl. illus. table, 9 refs.
(Contract AF 19(604)6643)
(AFCRL 62-832) Unclassified report

DESCRIPTORS: *Polymer solutions, *Thiazines, Absorption, Fluorescence, Spectrographic analysis, Reaction kinetics, Ions, Chlorides, Sulfates, Solubility, Solutions, Polymerization, Polymers, Dyes.

Beer Law deviations occur in even the most dilute solutions of thionine, in either chloride or sulfate systems. These effects are evidently caused by association of the dye cations, since ion-pairing cannot account for them. The low concentration spectrophotometric data fit a theoretical dimerization model, but the agreement disappears at moderate and high dye concentrations. Quantitative measurements of the dependence of the apparent extinction coefficient on added chloride ion in dye chloride systems leads to the conclusion that dimers and possibly trimers contain respectively one and two chloride ions. The data strongly indicate much higher polymerization at large concentrations, with gegenions playing a significant role; however, the dye salts out rapidly as counter ion concentration in the solution is increased. (Author)

5. COMMUNICATIONS

AD-286 137 Div. 5, 12
(TISTE/CRJ) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
RADIO (SELECTED ARTICLES).
28 June 62, 16p. (Trans. no. FTD-TT-62-532 from Radio, No. 11, pp. 3-7, 1961)
Unclassified report

DESCRIPTORS: *Space flight, *Spaceships, *Radio communication systems, *Voice communication systems, *Telephone communication systems, Telegraph systems, Manned, Satellite

vehicles, USSR, Translations, Radio transmission, Reliability, Communication equipment, Communication systems.

Contents:
About man's second flight into the cosmos
Radio communication earth-Vostok-2
Unforgettable signals

AD-286 153 Div. 5, 15, 6
(TISTP/MS) OTS price $2.60

Cornell U., Ithaca, N. Y.
ON THE TRANSFER FUNCTION FOR A RADIO SCATTER CHANNEL,
by H. E. Hardebeck. 15 Mar 62, 23p. incl. illus. 8 refs. (Research rept. no. RS 37; Scientific rept. no. 5)
(Contract AF 19(604)3494, Proj. 4603)
(AFCRL 62-571) Unclassified report

DESCRIPTORS: *Communication systems, *Radio waves, *Radio receivers, *Scattering, *Electromagnetic waves, Equations, Functions, Probability, Channel selectors, Radio transmission.

The formal proof that the components of a signal produced by the scattering of a monochromatic wave by random irregularities of refractive index are independently and normally distributed cannot be made with existing m-dependent central limit theorems. What is needed is a theorem that sets forth the maximum rate at which random variables may become more correlated as their number increases and yet allows the distribution function of their sum to approach the normal distribution. The theorem should be extendable to the case of random vectors of finite dimension. Further, the assumption of a correlation function for the fluctuation structure cannot produce the probability distribution function for $H(\omega_i, t_j)$. One can, however, calculate the power spectrum of the scattered wave from this correlation function. Assuming an isotropic exponential correlation function in both space and time, the power spectrum of y(t) was found for a monochromatic x(t). The result is not unreasonable compared to some experimental results. A correlation function in frequency was also computed. Unfortunately, sweep frequency experiments have not produced enough data as yet to make it possible to compare the data with the computed correlation function. (Author)

AD-286 277 Div. 5, 8
(TISTP/WH) OTS price $5.60

General Electric Co., Schenectady, N. Y.
LUNAR REFLECTION STUDY.
Final rept., pt. 2,
by Brian H. Claxton and Roy E. Anderson.
31 Aug 62, 48p. incl. illus. table, 21 refs.
(Contract AF 19(604)6634, Proj. 4603; In cooperation with General Electric Co., Syracuse, N. Y.)
(AFCRL 62-300, vol. 2) Unclassified report

DESCRIPTORS: *Radio communication systems, *Moon, *Electromagnetic wave reflections, *Radio receivers, *Radio transmitters, *Microwave networks, Doppler systems, Frequency modulation, Modulation, Sidebands.

The effective bandwidth of the lunar reflection path was determined. Doppler shift, signal strength, and amplitude fading of CW signals were measured, and the results analyzed and compared to theoretical predictions. Double sideband suppressed carrier transmissions centered at 915 Mc, with audio frequency modulation to produce two signals separated in frequency by a small amount, were reflected from the moon and received. The amplitudes of the two sidebands were separately recorded, and their correlation coefficient computed to give a measure of the quality of the circuit. Forty-five determinations of the correlation coefficient for 500 cps sideband separation gave a value of .26 ± .07, showing that the coherent bandwidth of the moon reflection path is extremely narrow. A standard word list was transmitted as a test on the actual quality to be expected of a voice circuit using relatively unsophisticated terminal equipment. A panel of listeners correctly ascertained 74% of the moon-reflected words, whereas 95% of the words on a similar list presented without distortion but in the same signal/white noise environment, were correctly judged. The difference is attributed to fading more than to distortion of the moon-reflected words. (Author)

AD-286 406 Div. 5
(TISTE/CAM) OTS price $1.10

Army Airborne, Electronics and Special Warfare Board, Fort Bragg, N. C.
DESERT TEST OF HIGH POWERED VOICE AMPLIFIER SYS 1492C.
7 Sep 62, 5p. 4 refs.
(Proj. CE 2261)
Unclassified report

DESCRIPTORS: *Audio amplifiers, *Public address systems, Transistors, Amplifiers, Desert tests, Climatic factors, Handling, Test methods, Airborne.

High Powered Voice Amplifier SYS 1492C, the test item, is a portable, transistorized public address set for distant projection of sound. The system is designed for operation from aircraft to ground and point-to-point over land and water. It is packaged for man transport and quick assembly at operational sites. The rated output is 250 watts of audio power from each of the two amplifiers. Two amplifiers are mounted side by side on one-half of a folding aluminum tubular framework. Two nickel-cadmium batteries and a reel of 100-foot cable for remote control are mounted on the other half. This assembly weighs 72 pounds. Four horns are provided with the system. Each horn contains two 75-watt drivers. A remote control is provided for parallel operation of two amplifiers from a single signal source. Power is furnished by the two nickel-cadmium batteries, or a 28-volt aircraft battery, or a 24-volt vehicle battery. The system has a range of approximately one mile. (Author)

AD-286 421 Div. 5
(TISTE/CAM) OTS price $2.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
THE DESIGN OF SURVIVABLE COMMUNICATIONS NETWORKS,
by Todd G. Williams. Oct 62, 24p. incl. illus. 7 refs. (Rept. no. RADC TDR 62-403)
Unclassified report

DESCRIPTORS: *Communication systems, *Military communications, Design, Communications equipment, Bombing, Strategic bombing, Tactical bombing, Vulnerability, Survival, Probability, Theory.

The design of communications networks that have a high probability of surviving the terminals which they serve when both the network and the terminal are subject to bombardment is presented. The probability of survival of a communications network can be increased by either hardening the elements of the network, adjusting the location of the elements, or adding additional redundant elements to the network. The choice of technique

in any given case is based on cost. The designer's problem is to specify the physical hardness and location of each element of the network so that the network cost is minimized and the network as a whole possesses a probability of survival which is compatible with that of its terminals. (Author)

AD-286 422 Div. 5, 30
(TISTP/WH) OTS price $1.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
A NEW APPROACH TO RELIABLE DATA TRANSMISSION ERROR-LOCATION CODES,
by Jack K. Wolf. Aug 62, 10p. 7 refs. (Rept. no. RADC TDR 62-362)
(Proj. 4519)
Unclassified report

DESCRIPTORS: *Data transmission systems, *Digital systems, *Errors, *Coding, Parity.

Error control in digital data communications is usually achieved by the use of error-detection or error-correction codes. In error-detection coding, the decoder is required merely to detect the presence of errors in a block of received digits while in error-correction coding the decoder must both detect and correct these errors. A technique is proposed which lies midway between these two common coding procedures. In this technique, referred to as error-location coding, errors are detected within the block of eived digits and, in addition, the location of these errors is specified to within a sub-block of the over-all larger block of digits. Upper and lower bounds are derived, for error-location codes, for the number of check digits required for a given error-location capability. A method is presented for constructing the parity check matrix for a large family of error-location codes, some of which are optimal in the sense that they satisfy the previously derived lower bound. Comparisons are made of the error-correction capability and error-location capability of codes. Also, applications of error-location codes are discussed. (Author)

AD-286 504 Div. 5
(TISTE/CAM) OTS price $18.50

Sylvania Electric Products, Inc., Waltham, Mass.
STUDY OF ADAPTABLE COMMUNICATIONS SYSTEMS. Fiinal rept.,
by D. Chesler. 14 June 62, 293p. incl. illus. tables, refs. (Rept. no. F-1008-1)
(Contract AF 30(602)2461)
(RADC TDR 62-314) Unclassified report

DESCRIPTORS: *Radio communication systems, *Radio receivers, *Satellite vehicles, *Space ships, *Feedback, Communication systems, Radio transmission, Data transmission systems, Multipath transmission, Wave transmission, Attenuation, Errors, Sequences, Coding, Probability, Computer logic, Signal-to-noise rato, Modulation, Mathematical analysis, Theory, Dipole antennas.

Studies on adaptable communication systems are reported, covering both adaptable receivers and repeat-request feedback systems using error-detection codes. The study on error-detecting codes deals with a multi-stage error-detection repeat-request system in which the receiver performs error detection on small blocks of binary digits and requests a repeat of each block in which an error is detected. It is shown that even with feedback errors the system has a high efficiency with a low probability of undetected error. Optimum thresholds are determined for use in dual-rate transmission over fading channels in conjunction with error-detection coding. The remaining studies deal with adaptable receivers. One investigation demonstrates the utility of a rake-type system for orbital dipole channels. The rake system studied is a generalization of the conventional rake system and has the advantage of allowing analog as well as digital modulation. (Author)

AD-286 596 Div. 5
(TISTE/CAM) OTS price $6.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NORMS FOR MAXIMUM ADMISSIBLE INDUSTRIAL RADIO INTERFERENCE (Normy Predel'no Dopustimykh Industrial'nykh Radiopomekh),
by A. Zharov. 10 Sep 62, 60p. incl. illus. tables (Trans. no. FTD-TT-62-572 from Gosudarstvennoye Izdatel'stvo Literatury Po Voprosam Svyazi i Radio, Moskva, 1961)
Unclassified report

DESCRIPTORS: *Radio interference, *Radio communication systems, Interference, Measurement, Reduction, Standards, Radio signals, Machines, Electrical equipment, Radiofrequency, Test methods, Instrumentation, Noise, Industrial equipment, USSR.

the development of radio communications, radio broadcasting, and television under conditions in which all forms of electrical devices are being introduced into industry, agriculture, and the everyday life made the struggle with industrial radio interference an extremely urgent problem. The historical resolutions of the 21st Congress of the cpsu provide for a high rate of increase in electric-power-station outputs with the objective of satisfying the growing power requirements of the national economy and those stemming from the everyday needs of the population, as well as to permit further development of communications, radio-broadcasting, and television facilities and introduce radio-relay communications and usw radio broadcasting; also, the problem of combating industrial radio interference acquired even greater urgency. To aid in the struggle against industrial radio interference, norms for maximum admissible industrial radio-interference levels were devised. (Author)

AD-286 609 Div. 5, 15
(TISTE/CAM) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A REMARK ON THE TRAFFIC CAPACITY OF A DISCRETE COMMUNICATIONS CHANNEL WITHOUT NOISE,
by Yu. I. Lyubich. 29 Aug 62, 11p. 6 refs. (Trans. no. FTD-TT-62-1144 from Uspekhi Matematicheskikh Nauk, 17:103, pp. 191-198, 1962)
Unclassified report

DESCRIPTORS: *Communication systems, *Data transmission systems, Trafficability, Noise (Radio), Noise, Reduction, Theory, Mathematical analysis, Signal-to-noise ratio, Translations, USSR.

AD-286 611 Div. 5, 12
(TISTE/CRJ) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AN ASTRO-SHIP CALLS THE EARTH (SUPER-LONG

DISTANCE COMMUNICATIONS WITH A SPACE SHIP),
by V. A. Sokolov and Yu. F. Ivanov. 27 Aug 62, 15p. incl. illus. (Trans. no. FTD-TT-62-721 from Nauka I. Zhizn, No. 2, pp. 13-19, 1962)
Unclassified report

DESCRIPTORS: *Spaceships, *Radio communication systems, *Light communication systems, USSR, Lasers, Ruby, Theory, Air to surface, Surface to air, Translations, Communication systems.

AD-286 654 Div. 5
(TISTP/TL) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
FAST WAVE RADIATORS,
by Leonard Hatkin. 1962, 14p. incl. illus. table, 8 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Communications theory, *Radio antijamming, *Antennas, Radio signals, Wave transmission, Waveguides, Radio interference.

Fast wave radiation as dealt with in this paper refers to radiation from antennas which carry currents travelling at a phase velocity greater than that of light in vacuo. An introductory section describes slow and fast waves travelling along guiding structures, and points out the inherent differences between them. The general properties of fast waves on transmission lines are deduced from a simplified analysis. A fast wave antenna is next described consisting of two parallel, electrically balanced strip lines. The high phase velocity is caused by shunt loading the parallel strips by means of conducting pins connecting the strips. Theoretical phase shift and attenuation constants are obtained for this structure by the transverse resonance method. Measurements of these parameters as well as patterns are presented and good agreement with calculated values is demonstrated. Applications and future promising work are discussed and recent work in applying the principles is also mentioned. (Author)

AD-286 656 Div. 5, 25
(TISTP/WH) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
FAST RESPONSE SOLID STATE PME DETECTOR FOR LASER SIGNALS,
by A. Boatright and H. Mette. 1962, 16p. incl. illus. table, 17 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Light communication systems, *Lasers, *Photomultipliers, *Photoelectric effect, *Magnetic fields, *Solid state physics.

The photomagnetoelectric effect in germanium can be used for building sensitive, fast response photodetectors if the following two conditions are fulfilled: (a) semiconductor slabs are made very thin and, (b) the front surface recombination velocity is made low. A germanium device, e.g., in which the sample is placed between the poles of a small permanent magnet, produces output voltages of 200 mv with response times of below 10-7 seconds at high light intensities. The thin Ge wafers used in this device were obtained by controlled photoetching of single crystals to a thickness down to 6 microns whereby the current leads for the etching are arranged in such a way that they serve later as PME leads. Preliminary tests with PME cells reproduced the fine structure of ruby laser signals with a similar resolution as photomultiplier tubes. The ultimate limit of the response time is believed to be in the nanosecond range, making it possible to use the detector as demodulater in high volume optical communication systems. (Author)

6. DETECTION

AD-286 032 Div. 6
(TISTW/RD) OTS price $11.50

Electrical Engineering Research Lab., U. of Illinois, Urbana.
AN INVESTIGATION OF SPACE DIVERSITY RADIO DIRECTION FINDING,
by Richard Lee Sydnor. 30 Apr 62, 150p. incl. illus. tables, 40 refs. (Technical rept. no. 17) (Contract Nonr-183402, Proj. NR 371-161)
Unclassified report

DESCRIPTORS: *Direction finding, *Bearing finding, *Diversity reception, Ionospheric propagation, Statistical analysis, Errors, Reduction, Radio interference, Attenuation, Direction finding stations, Antennas, High frequency, Radio equipment.

The object of this investigation is to determine how far apart radio direction finders should be placed in order to obtain statistically independent samples, and to establish the number of radio direction finders to be included in the ensemble average. The conclusions are based upon high frequency radio direction finder bearing data observations obtained from two small aperture radio finders separated by a variable distance. Crossed-Adcock type direction finders were used and the separation distance was varied from 1/32 to 1/4 mi. The data were obtained over a period of approximately one yr during the time when conditions in the ionosphere were normal. (Author)

AD-286 150 Div. 6
(TISTW/RD) OTS price $4.60

David Taylor Model Basin, Washington, D. C.
A MODEL TRACKING SYSTEM FOR THE DTMB MANEUVERING BASIN,
Instrumentation Div. research and development rept.,
by F. E. Frillman. Sep 62, 41p. incl. illus. 4 refs. (Rept. no. 1594)
Unclassified report

DESCRIPTORS: *Submarine models, *Ship models, *Tracking, *Model basins, Instrumentation, Underwater, Transmission, Transducers, Pulse transmitters, Ultrasonic radiation.

The fundamentals of a system are explained for tracking both submarine and surface models in the maneuvering basin at the David Taylor Model Basin. The system employs underwater ultrasonic ranging techniques to establish, repetitively, the horizontal rectangular coordinates of a model-borne transmitter. The discussion includes mathematical considerations, instrumentation measurement techniques, a description of experimental instruments, and the results of evaluation experiments. (Author)

Division 6 - DETECTION

AD-286 241 Div. 6
(TISTW/RD) OTS price $1.10

Hallicrafters Co., Chicago, Ill.
JAMMER EVALUATOR QRC-184(T).
Monthly progress rept. no. 1, 25 June-1 Aug 62. 10 Aug 62, 7p. (Rept. no. HLC 094-903294)
(Contract AF 33(657)9312)
Unclassified report

DESCRIPTORS: *Radar jamming, *Radar transmitters, Countermeasures, Airborne, S band.

The requirements of a QRC-184(T) jamming evaluator are given. It will consist of two different RF plug-in heads and a control unit. Either RF plug-in unit, when mechanically joined with the control unit, will form a single unit which is similar in dimensions to the AN/ALT-13(V) transmitter. RF plug-in units will contain all the components circuitry necessary to produce the necessary displays on an auxiliary oscilloscope. The control unit will provide the flexibility to accept different RF heads. This configuration will allow the frequency range of the QRC-184(T) to be extended with a minimum of expense. An oscilloscope will also be provided for display purposes. The technique incorporated in the QRC-184(T) shall be, essentially, electronically scanning or switching the various filter networks at a given commutation rate so that output signals from these filters may be appropriately processed and made available as input signals to an oscilloscope for display purposes. (Author)

AD-286 342 Div. 6
(TISTW/RD) OTS price $3.60

Straza Industries, El Cajon, Calif.
DESIGN, DEVELOPMENT AND CONSTRUCTION OF ONE ELECTROLUMINESCENT SONAR DISPLAY.
Quarterly interim development rept. no. 3, 1 Dec 61-28 Feb 62,
by A. D. Gomez. 28 Feb 62, 34p. incl. illus.
(Contract NObsr-85430)
Unclassified report

DESCRIPTORS: *Sonar, *Display systems, *Luminescence, Phosphors, Thin films, Dielectric films, Tuned circuits, Sonar equipment.

Display processing studies were continued with the major effort on obtaining a dielectric frit having the necessary characteristics for use in the display. Firing schedules were varied to obtain a uniform layer having the proper electrical properties. The electrical requirements for the analyzer filter were established. The simple tuned circuit approach was discarded because of excessive cost and a Q multiplier circuit was developed which was less complex and of reduced weight. The LC circuit is analyzed and the control parameters established. (Author)

AD-286 648 Div. 6, 12, 22
(TISTW/JRG) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
THE DOPLOC DARK SATELLITE TRACKING SYSTEM,
by A. L. Debey and V. W. Richard. 1962, 12p. incl. illus. tables, 6 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Satellite vehicles, *Doppler tracking, *Satellite vehicle trajectories, *Tracking, *Radio signals, Rocket trajectories, Projectiles, Rockets, Guided missiles, Guided missile tracking systems, Projectile trajectories, Determination, Doppler systems, Reflection.

The DOPLOC dark satellite tracking system is described and tracking results are presented. DOPLOC is a radio reflection Doppler tracking system deriving its name from the Doppler frequency phase-locked tracking filter technique used. Dark, i.e. nonradiating, satellites are illuminated by a ground-based transmitter and signals reflected from illuminated satellites are received at one or more ground-based receiving sites. A unique method has been developed for the determination of a complete set of orbital parameters from Doppler data recorded in the course of a single pass of a satellite. Numerous orbital solutions have been obtained with Doppler data from a single receiver recorded during a single pass of a satellite. Computing times of 2 to 4 minutes are required with the BRLESC computer. The DOPLOC tracking method has general application to the tracking of projectiles, rockets, guided missiles and space vehicles. (Author)

AD-286 664 Div. 6, 22
(TISTW/PCR) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
FEASIBILITY OF NON-METALLIC MINE DETECTION BY EARTH'S MAGNETIC FIELD DISTORTION,
by Stanley L. Carts, Jr. 1962, 14p. incl. illus. tables, 17 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Detectors, *Magnetic detectors, *Mines, Soils, Magnetometers, Instrumentation, Detection.

An investigation to determine the worldwide feasibility of a passive magnetic method for detection of nonmetallic land mines is discussed. The work included ascertaining the natural restrictions imposed upon a passive magnetic detection system by the magnetic properties of soil containing buried mines. A special measuring system was developed by USAERDL for these studies. The report concludes that: (a) Use of a passive magnetic mine detection system as a sole means of detection is not feasible in 74 of the world's land surface; in 12 because of insufficient mine-soil susceptibility contrast alone; in 40% because of excessive magnetic anomalous (false) signal effects alone; and in 22% because of both insufficient contrast and excessive anomalies. (b) More sensitive instrumentation will not improve the world-wide feasiblility of passive magnetic mine detection systems because severe restrictions are imposed on the use of passive magnetic phenomenon by natural magnetic soil properties, and not by inadequate instrument sensitivity. (Author)

AD-286 670 Div. 6
(TISTW/RD) OTS price $3.60

Operations Evaluation Group, Office of Naval Operations, Washington, D. C.
ECHO VARIABILITY AND THE FORMULATION OF A RADAR THEORY,
by C. F. Kent. 17 Aug 62, 1v. incl. illus. tables. (OEG Study 644-A)
Unclassified report

DESCRIPTORS: *Aerial targets, *Radar reflections, Radar, Theory, Radar tracking, Radar targets, Radar scanning, Radar echo areas, Ultra high frequency, Detection, Aircraft.

Basic considerations important to the fabrication of a mathematical model of operational radar performance are given. Experimental evidence gathered at 425 mc is used to show the presence of substantial long-term undulations in the mean returned signal from a target at constant range. The implications of undulations of this magnitude in the construction of a theory are reviewed, and experimental investigation of their sources is strongly recommended. (Author)

AD-286 772 Div. 6, 25
(TISTW/RD) OTS price $1.60

Space Plasma and Radiation Lab., U. of Colorado, Boulder.
ULTRAVIOLET REFLECTIONS.
Final rept., 2 Mar 59-31 Jan 62,
by William A. Rense. 31 Jan 62, 4p. tables, 2 refs.
(Contract AF 19(604)5533, Proj. 6688)
(AFCRL 62-282) Unclassified report

DESCRIPTORS: *Ultraviolet radiation, *Thin films, Polarization, Temperature, Magnesium compounds, Fluorides, Monoxides, Silicon compounds, Zinc compounds, Sulfides, Reflection.

The apparatus used to investigate the reflection and transmission coefficients of thin films in the spectral region 300-2000 A is described. Results of both experimental and theoretical work are briefly summarized and reference to more detailed reports is made. Two Tables are given summarizing the final experimental values of optical coefficients for several substances (metals and dielectrics) for various wavelengths in the vacuum ultraviolet. Polarization and temperature effects are commented on. An outline of a report on the present state of the theory of dispersion in the far ultraviolet is presented. (Author)

AD-286 835 Div. 6
(TISTP/FR) OTS price $1.75

Naval Ordnance Lab., Corona, Calif.
SYNCHRONIZATION METHODS FOR PCM TELEMETRY.
Final rept. Apr 59-Sep 60.
Aug 62, 59p. incl. illus. tables, 8 refs.
(Rept. no. NOLC-542)
(Proj. 4107)
(ASD TR 61-9) Unclassified report

DESCRIPTORS: *Pulse modulation, Telemeter systems, Coding.

A specially coded synchronization pattern is required for proper identification of repetitive frames of pulse-code-modulated (PCM) sequences of binary bits. Study has shown that, with an assumed set of criteria, there are many favorable sync patterns. An efficient pattern is described on the basis of assumed criteria and hardware implementation at NOLC. This pattern is compared with sync patterns proposed by others A recommendation is made that a maximum frame sync pattern of 33 bits be specified at present and the choice of optimal patterns be determined by future study. Part I summarizes the conclusions reached in the sync study at NOLC; Part II presents a detailed mathematical analysis, experimental results, and extensive diagrams. (Author)

7. ELECTRICAL EQUIPMENT

AD-285 648 Div. 7, 25, 26
•(TISTM/EJH) OTS price $3.60

Radio Corp. of America, Somerville, N. J.
GALLIUM ARSENIDE SOLAR CELL PRODUCTION PROCESSES AND TECHNIQUES.
Interim technical documentary progress rept. no. 1, 15 July-15 Sep 62,
by R. D. Gold, ed. by A. L. Leotti. 15 Sep 62, 28p. incl. illus. table.
(Contract AF 33(657)8921)
Unclassified report

DESCRIPTORS: *Solar cells, *Power supplies, *Photoelectric cells, Single crystals, Crystals, Gallium compounds, Arsenides, Growth, Impurities, Semiconductors, Germanium, Silicon, Photoelectric materials, Solar energy, Manufacturing methods, Production, Ultrasonics, Design.

In order to facilitate fabrication of solar cells for initial process experiments, the fabrication process developed under contract NAS5-457 and presently in use for contract AF33(657)-8490 was adopted. The present process reflects some improvements over previous ones. For example, the use of single crystal GaAs grown in the 111 direction resulted in a considerable savings in GaAs as the wafers are now only slightly larger than the required 1 x 2 cm dimensions. Use of a cavitron machine for ultrasonic cutting leads to more uniform and better controlled wafer dimensions. The present process resulted in typical efficiencies between 6 and 8% with maximum efficiencies near 10%. Cells now being made with GaAs are doped with either Ge or Si. In order to eliminate variations due to differences in processing, several wafers from each of the different crystals are being processed simultaneously. An experiment performed to evaluate fabrication procedures indicates that the use of a tungsten light for optimization of cell efficiency by etching will result in an optimized cell for sunlight. (Author)

AD-285 658 Div. 7
(TISTM/ODN) OTS price $3.60

TYCO Labs., Inc., Waltham, Mass.
RESEARCH RELATING TO FUEL CELLS.
Quarterly rept. no. 3, 1 Apr-30 June 62,
by A. K. M. Shamsul Huq. 30 July 62, 22p. illus.
(Contract DA 49-186-ORD-982)
Unclassified report

DESCRIPTORS: *Fuel cells, *Electrolytic cells, *Oxygen electrodes, Materials, Electrodes, Platinum, Sulfuric acid, Hydrogen compounds, Peroxides, Oxygen, Solutions, Electric potential, Electrochemistry, Reduction, Electrolytes, Thermodynamics.

Experimental results were obtained for the anodic evolution and cathodic reduction of O2 in H_2SO_4 solutions on bright Pt electrodes. The production of H_2O_2 on O2 reduction was observed. Results were obtained for the resting potential of bright Pt electrodes in H_2SO_4 solutions with pH and H_2O_2 concentrations as variables. The results are compared with results previously reported for similar systems. The anodic oxidation and cathodic reduction of H_2O_2 in H_2SO_4 solutions on bright Pt electrodes were examined in absence of O2 with pH and H_2O_2 concentrations as variables. Conclusions regarding

the O2 electrode mechanisms are drawn which appear to be consistent with the experimental results obtained. Theoretical calculations are introduced in support of these conclusions. (Author)

AD-285 666 Div. 7, 1, 12, 8, 25
(TISTE/CRJ) OTS price $8.10

American Machine and Foundry Co., Alexandria, Va.
SOLID STATE MATRIX.
Quarterly rept. no. 2, 1 July-30 Sep 62,
by R. N. Stock and R. W. Powell. 15 Oct 62,
74p. incl. illus. tables.
(Contract AF 33(657)8688)
Unclassified report

DESCRIPTORS: *Transmission lines, *Solid state physics, *Electric power production, Circuits, Electronic circuits, Switching circuits, Life expectancy, Reliability, Airborne, Control systems, Electrical equipment, Power supplies, Pulse generators, Electronic switches, Semiconductors, Firing circuits, Rectifiers, Transistors, Direct current, Alternating current, De-icing systems, Electromechanical converters.

Research was continued in an effort to develop an efficient and practical solid state transmission link (electrical power switching system) that will have positive advantages over the conventional electromechanical transmission links used in present-day aircraft. Primary emphasis is on reliability and long life. The 2 major areas of effort that were completed were the detailed logic design and the circuit design. An initial task was the preliminary selection of the active devices to be used in designing circuits from among those evaluated previously. (Author)

AD-285 687 Div. 7
(TISTE/CAM) OTS price $1.10

Aeronautical Electronic and Electrical Lab.,
Naval Air Development Center, Johnsville, Pa.
TECHNICAL NOTE, FLAT CABLE, WHERE DO WE STAND,
by P. Ardizzi. 5 Oct 62, 7p. (Rept. no. NADC-EL-N6267)
Unclassified report

Presented at a BuWeps Symposium on Aircraft Wiring System Components, 16-17 Oct 1962, Washington, D. C.

DESCRIPTORS: *Electric cables, *Electric wire, Conductors, Standards, Aircraft, Airborne, Reliability, Design, Effectiveness.

This presentation covers experiences in the application of flat cable in aircraft systems. In addition, probelms are presented to illustrate the need for standards for flat cable which must be established before the cable can be fully utilized by the application engineer. (Author)

AD-285 849 Div. 7
(TISTP/FR) OTS price $1.10

Martin-Marietta Corp., Baltimore, Md.
RESEARCH PROGRAM ON MAGNETOHYDRODYNAMIC ELECTRIC POWER GENERATORS WITH AUXILIARY IONIZATION.
Quarterly progress leter no. 1, 15 June-15 Sep 62,
by W. B. Bienert and C. Shih. 15 Sep 62, 3p.
(Rept. no. MND-2866-1)
(Contract Nonr-386600, Proj. 9800)
Unclassified report

DESCRIPTORS: *Generators, *Magnetohydrodynamics, Design.

The objectives of this program are: 1) the development, fabrication, and testing of an MHD experimental apparatus for measuring the increase in the output power density by auxiliary means of ionization; 2) the theoretical and experimental study of ionization phenomena pertaining to the auxiliary ionization mode of operation of an MHD generator; 3) the study and analysis of a closed cycle MHD power generator with auxiliary or non-equilibrium ionization for reactor heat source application. (Author)

AD-285 948 Div. 7, 12
(TISTM/EJH) OTS price $4.60

Allison Div., General Motors Corp., Indianapolis, Ind.
DESIGN AND DEVELOPMENT OF A LIQUID METAL CELL.
Quarterly technical progress rept. no. 3, 1 Jul-30 Sep 62,
by B. Agruss, H. R. Karas and V. L. Decker.
12 Oct 62, 39p. incl. illus. tables (Rept. no. EDR 3050)
(Contract AF 33(657)7847) Unclassified report

DESCRIPTORS: *Electrolytic cells, *Power supplies, Liquid metals, Ceramic materials, Electrolytes, Seals, Composite materials, Feasibility studies, Spaceships, Deterioration, Magnesium compounds, Aluminum compounds, Oxides, Potassium compounds, Hydroxides, Iodides, Bromides, Potassium, Mercury, Conductivity, Flowmeters.

Work was concerned with further investigation of the problems associated with the oxide ceramics being used, preliminary investigation and evaluation of other possible electrolyte systems, initial evaluation of properties of six-micron composite paste matrices, evaluation of a heat balance flowmeter, and further testing of matrixless cell characteristics for the study of optimum cell performance. The electrochemical feasibility and regenerative capability of a potassium-mercury liquid metal cell was proved. Conductivity measurements for the six-micron average particle size composite matrix were completed. (Author)

AD-286 118 Div. 7, 17
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command,
Wright-Patterson Air Force Base, Ohio.
THE PROSPECTS AND THE POSSIBILITIES OF USING ALUMINUM IN ELECTRIC MACHINES,
by V. V. Peregudov. 4 June 62, 7p. 4 refs.
(Trans. no. FTD-TT-62-676 from Izvestiya Vysshikh Uchebnykh Zavedeniy, Elektromekhanika, No. 1, pp. 121-124, 1961)
Unclassified report

DESCRIPTORS: *Electrical equipment, *Aluminum, Turbines, Generators, Transformers, Aluminum wire, Filament wound construction, USSR.

AD-286 133 Div. 7, 1
(TISTE/CRJ) OTS price $10.10

Foreign Tech. Div., Air Force Systems Command,
Wright-Patterson Air Force Base, Ohio.
DESIGNING DIRECT-CURRENT MOTORS AND GENERATORS FOR AIRCRAFT (SELECTED CHAPTERS),
by A. I. Bertinov and G. A. Riznik. 20 June 62,
121p. incl. illus. tables (Trans. no. FTD-TT-62-173 from Gosudarstvennoye Izdatel'stvo Oboronnoy Promyshlennosti Moskva, pp. 10-13, 85-89, 266-278, 316-398, 1958)
Unclassified report

DESCRIPTORS: *Electric motors, *Generators, *Aircraft, Direct current, Airborne, Cooling, Heating, USSR, Translations, Electromagnetic

fields, Electromagnetic properties, Electrical networks, Bearings, Ball bearings, Temperature, Heat transfer, Thermal conductivity, Commutators, Electrical equipment.

Contents:
Electromagnetic calculations for dc aircraft electrical machinery
Basic elements of design and mechanical calculations
Cooling and heating electrical machines
Examples of calculations for dc aircraft electrical motors and generators

AD-286 135 Div. 7
(TISTM/EJH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
RADIO (SELECTED ARTICLES).
14 June 62, 7p. incl. illus. tables (Trans. no. FTD-TT-62-357 from Radio, pp. 39, 59-61, Oct 1961)
Unclassified report

DESCRIPTORS: *Storage batteries, *Power supplies, Transistors, Cadmium, Nickel, Manganese, Zinc, Mercury, Cylindrical bodies, Operation, Maintenance, Disks, Seals, USSR.

Contents:
Restoration of storage batteries
Small size hermetically sealed batteries

AD-286 187 Div. 7
(TISTP/TL) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE TEMPERATURE FIELD OF A DISCHARGE IN AN ELECTRICAL IGNITION SYSTEM,
by M. V. Gutovskiy. 8 June 62, 16p. incl. illus. 7 refs. (Trans. no. FTD-TT-62-795 from Izvestiya Vysshikh Uchebnykh Zavedeniy. Energetika, No. 8, pp. 37-46, 1961)
Unclassified report

DESCRIPTORS: *Ignition systems, *Electrical discharges, Temperature, Fuels, Synthesis, Differential equations.

The present analysis is devoted to the procedure for plotting and investigating the temperature field of an electrical discharge in an engine-ignition system. (Author)

AD-286 255 Div. 7
(TISTE/CAM) OTS price $1.60

Electronic Communications, Inc., Timonium, Md.
PROTOTYPE HIGH POWER CIRCULATOR.
Interim engineering rept., 20 July-20 Oct 62. 20 Oct 62, 5p. incl. illus.
(Contract NObsr-87394)
Unclassified report

DESCRIPTORS: *Waveguides, Model tests, Ultra high frequency, Radiofrequency power, Voltage, Ferroelectricity, Current limiters, Temperature, Measurement, Test methods, Direct current, Electrical properties, Ferroelectric materials.

The high power y-circulator was modified and tested to be used as a prototype model. Low power measurements were made to check the characteristics of this unit as compared to the experimental model. The results show that the modifications have made no change in the operation of the circulator. High voltage tests were made to determine if the new transitions and ferrite enclosure are capable of withstanding the electric field of a high power RF source. The results show that 1 megowatt of RF power could be handled with no electrical breakdown. Measurements of the properties of a ferroelectric material to be used in a limiter for the circulator package were made. (Author)

AD-286 301 Div. 7, 26
(TISTE/CAM) OTS price $8.60

Mallory, P. R., and Co., Indianapolis, Ind.
DEVELOPMENT OF A HIGH TEMPERATURE SEALED WIRE WOUND VARIABLE RESISTOR.
Final technical engineering rept., Oct 58-Aug 62, by James A. Fred. Aug 62, 38p. illus.
(Contract AF 33(600)37951)
(ASD TR 62-7-510)
Unclassified report

DESCRIPTORS: *Variable resistors, *Manufacturing methods, Seals, Wire, Temperature, Life expectancy, Insulating materials, Design, Test methods, Failure (Mechanics), Electrical properties, Pressure, Vibration, Resistance, Moisture proofing, Corrosion, Storage, Production.

Hermetically sealed variable wirewound resistors were manufactured using the equipment and processes described. The design of the sealed variable wound resistor provided that the completed resistor will be insensitive to most environments. Finished units were able to withstand such tests as torque, temperature cycling, high temperature exposure, load life, salt spray corrosion, moisture resistance, insulation resistance, low temperature storage, acceleration, shock, and vibration. Most of the equipment used to make these sealed variable resistors was of standard commercial design with special jigs and fixtures attached where needed. (Author)

AD-286 355 Div. 7
(TISTM/TCG) OTS price $2.60

Delco-Remy Div., General Motors Corp., Anderson, Ind.
SILVER ZINC SECONDARY BATTERY INVESTIGATION.
Quarterly technical progress rept. no. 1, 1 July-1 Oct 62,
by J. J. Lander and J. A. Keralla. 1 Oct 62, 20p. incl. illus. table.
(Contract AF 33(657)8943, Proj. 8173)
Unclassified report

DESCRIPTORS: *Storage batteries, *Electrolytic cells, *Silver compounds, *Zinc compounds, *Alkaline cells, Additives, Palladium, Powder metals, Polymers, Ethylenes, Oxides, Vinyl alcohol, Battery compartments, Hydrogen, Electrolytes, Potassium compounds, Hydroxides.

Pd additions to the Ag positive plates of 0.2, 0.5, and 1% were tested in 25 amp/hr cells on the 2-hr cycle period. It was found that 1% Pd addition produces the maximum monovalent charge capacity of 50% and retains this level for approximately 200 cycles. Ag powders of different particle size were incorporated into 2 amp/hr cells and preliminary cycle data was obtained. Negative plates containing polyethylene oxide and polyvinly alcohol are on the 2-hr cycle program. Five hundred cycles at 25% depth of discharge have been reached to date. Hydrogen evolution data was obtained from zinc negative plates containing 1, 2, and 4% HgO in various concentrations of KOH for a 2-wk period. (Author)

AD-286 545 Div. 7, 30
(TISTE/CAM) OTS price $5.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DEPOSITED CONNECTIONS AND WIRING.

by E. A. Guditz. 7 Sep 62. 16p. illus. 13 refs.
(Rept. no. 51G-3)
(Contract AF 19(628)500)
(AFESD TDR 62-140) Unclassified report

DESCRIPTORS: *Electric connectors, *Switching circuits, *Packaged circuits, *Printed circuits, Transmission lines, Electronic circuits, Disconnect fittings, Processing, Copper, Bonding, Electroplating, Encapsulation, Computers, Computer logic.

Deposited connections and wiring are evaluated following application of the technique to various prototype electronic-computer equipment. The process was used chiefly in multi-layer transmission-line wiring and in pluggable circuit packages. The former was more successful in terms of ease of construction and immediate practical application. Two-layer etched transmission-line wiring, with deposited inter-layer connections in plated-through holes, is now in use in parts of the new FX-1 high-speed digital computer. In other applications deposited connections in blind plated holes were used to interconnect two-layer wiring for circuit packages and three-layer wiring for back panels. Conductors in flexible flat cables were interconnected with deposited connections by encapsulating and facing-off the ends of the stacked cables and selectively interconnecting conductors with photo-etched chemically-reduced and electroplated copper. Advantages, limitations, and processing details are discussed for each application. It is recommended that deposited connections be considered for additional applications in which it might be difficult, or impossible to employ conventional interconnection methods. (Author)

AD-286 567 Div. 7
(TISTP/FR) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
EXAMPLES OF THERMOELECTRIC DEVICES (CHAPTER IV),
by A. F. Ioffe. 12 Sep 62, 32p. incl. illus. tables (Trans. no. FTD-TT-62-226 from Poluprovodnikovyye Termoelementy, IZDVO AN SSSR, Moscow pp. 126-153 (Chapter IV) 1960)
Unclassified report

DESCRIPTORS: *Thermoelectricity, Power supplies, Cooling, Refrigeration systems, Microtomes, Hygrometers, Thermometers, Crystallization, Materials.

Contents:
Thermoelectric generators
Refrigerators
Microtome
Thermode
Microscope stage
Condensation hygrometer
Heating and air conditioning
Meters for radiant fluxes and heat flows
Surface temperature measurement
Crystallization
High-temperature thermoelements

AD-286 572 Div. 7
(TISTP/FR) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THERMIONIC ENERGY CONVERTERS,
by I. I. Damaskina and G. A. Chetverikova. 28 Aug 62, 10p. incl. illus. table, 15 refs. (Trans. no. FTD-TT-62-666 from Teploenergetika 3: pp. 82-86, 1962)
Unclassified report

DESCRIPTORS: *Thermionic emission, Power sources, Cesium, Vapors.

AD-286 578 Div. 7
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
SOLAR BATTERIES OF THE FUTURE,
by M. Koltun. 5 Sep 62, 6p. (Trans. no. FTD-TT-62-972 from Nauka i Zhizn' pp. 63-64, 10 Oct 61)
Unclassified report

DESCRIPTORS: *Solar cells, *Solar energy, *Fuel cells, *Power supplies, Silicon, Intermetallic compounds, Photoelectric cells.

The conversion of helioenergetics into an independent and important technological field is discussed. Outstanding scientists of the world, including Frederic Joliot-Curie, feel that helioenergetics will be put on an equal footing with the study of atomic energy. In this connection scientists await further research. (Author)

AD-286 686 Div. 7
(TISTM/ODN) OTS price $2.75

Army Signal Research and Development Lab., Fort Monmouth, N. J.
FUEL CELLS.
Status rept. no. 3,
by Herbert H. Hunger, Fritz R. Franke, and John J. Murphy. 1 June 62, 29p. incl. tables, 53 refs.
Unclassified report

DESCRIPTORS: *Fuel cells, *Combustion, *Reports, Bibliography, Patents, Electrolytes, Electrolytic cells, Electrodes, Power supplies, Fuels, Inorganic substances, Electrochemistry.

Information on fuel cell R&D being performed by various Government agencies is reported which includes both in-house and contractual programs. Abstracts of recent literature and reference pertaining to fuel cell work, a fuel cell glossary, and a list of domestic and foreign patents on fuel cells are also given. Although many systems are under investigation, fuel cells are still in the R&D stage. Emphasis is placed on improving performance, materials and components; the study of electrode reactions; and design and the development of experimental models. (Author)

AD-286 700 Div. 7
(TISTP/MS) OTS price $2.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
HIGH-TEMPERATURE VAPOR-FILLED THERMIONIC CONVERTER.
Quarterly technical progress rept. 1 July-30 Sep 62,
by W. Godsin. 10 Oct 62, 14p. incl. illus. 2 refs. (Rept. no. GA-3562)
(Contract AF 33(657)8563, Proj. 8173)
Unclassified report

DESCRIPTORS: *Electric power production, *Power supplies, *Thermionic emission, Uranium compounds, Carbides, Zirconium compounds, Vacuum systems.

Cell E was operated for 1034 hours, proving the feasibility of continuous high-temperature long-term operation of carbide emitters. The output current (and power) of the cell was lower than desired due to apparent low emission from the carbide emitters used in Cell E. The reasons why the expected higher currents were not obtained in Cell E, remains the central problem under

investigation. A 10 UC - 90 ZrC emitter is installed in Cell F. Thermocouple installation and calibration and high-temperature vacuum emission tests are being conducted prior to the final closure of the cell. A second cell structure is on hand and an emitter will be installed pending the results of surface preparation. Vacuum emission studies of three UC compositions--10 UC 90 ZrC, 30 UC - 70 ZrC, and 90 UC - 10 ZrC--demonstrate that emission behavior is essentially independent of bulk uranium content. The presence of some uranium on the emitting surface is of the utmost importance. Intentional poisoning of the surface of sample emitters was produced by exposure to air at room temperature. In order to maximize the probability of satisfactory performance, we have concluded that it is necessary to properly activate the emitter surface in addition to providing a clean cell environment during operation. (Author)

AD-286 889 Div. 7, 4
(TISTM/ODN) OTS price $1.50

Lockheed Aircraft Corp., Sunnyvale, Calif.
NEW CATHODE-ANODE COUPLES USING NONAQUEOUS ELECTROLYTES.
Final annual technical rept., Dec 61-Aug 62, by J. E. Chilton and G. M. Cook. Sep 62, 48p. incl. illus. tables, 3 refs.
(Contract AF 33(616)7957, Proj. 8173)
(ASD TDR 62-837) Unclassified report

DESCRIPTORS: *Storage batteries, *Power supplies, *Cathodes (Electrolytic cell), *Anodes (Electrolytic cell), Electrolytic cells, Electrolytes, Electrodes, Lithium, Silver compounds, Nickel compounds, Chlorides, Carbonates, Propenes, Aluminum compounds, Electrical conductance, Metals, Electric currents, Polarization, Materials, Tests, Voltage, Electrochemistry, Solutions, Satellite vehicles.

New cathode-anode couples using nonaqueous electrolytes were investigated as secondary batteries for use in orbiting satellites. A Li anode is used with either a AgCl or NiCl2 cathode in an electrolyte consisting of $C_3H_6CO_3$, $AlCl_3$, and LiCl. The solubility of lithium chloride was found to increase with increasing $AlCl_3$ concentration. Electrical conductivity measurements showed low activation energy for conduction. Migration experiments agreed with the predicted mechanism. Electrode reactions were studied in detail. The $C_3H_6CO_3$-$AlCl_3$ electrolyte was found to be stable. Many metals were anodically oxidized in this electrolyte and found to be somewhat soluble and therefore unsuitable for use. Li metal was electrodeposited at 100% efficiency at current densities up to at least 80 ma/sq cm. NiCl2 was produced at 100% efficiency only at very low current densities, whereas AgCl was produced at 100% efficiency at current densities up to at least 72 ma/sq cm. Polarization experiments indicated that mass transport may be the limiting factor for the AgCl cathode during discharge. Electrode spacing experiments indicated that cells are limited primarily by resistance. A cell was successfully cycled at -28 C. (Author)

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-285 605 Div. 8, 2, 1
(TISTA/VGW) OTS price $10.10

Denver Research Inst., Colo.
BALLOON FLIGHT OF MARCH 21, 1962,
by David G. Murcray, James N. Brooks and others.
21 Sep 62, 120p. incl. illus. (Flight data rept. no. 4)
(Contract AF 33(616)7633)
Unclassified report

DESCRIPTORS: *Meteorological balloons, *Radiometers, *Sky brightness, *Infrared radiation, *Ultraviolet radiation, High altitude, Flight testing, Meteorological data, Automatic, Programming.

The results are reported of a balloon flight made with an automatic programmed radiometer system. The equipment was launched from Holloman AFB, New Mexico, March 21, 1962. The radiometer was equipped with a liquid oxygen cooled in Sb cell as a detector and measurements were made of the infrared background radiation from 1.8 mu to 5.0 mu. (Author)

AD-285 628 Div. 8
(TISTP/WH) OTS price $6.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
AMPLITUDE AND PHASE DEVIATION IN WAVEGUIDES WITH SHUNT DEVICES,
by Alan H. Kessler. 8 June 62, 68p. incl. illus. tables, 3 refs. (Rept. no. 46G-1)
(Contract AF 19(604)7400)
(AFESD TDR 62-135) Unclassified report

DESCRIPTORS: Wave transmission, *Waveguides, *Wave characteristics, *Simultaneous equations, *Numerical methods and procedures, Radio waves.

A simple method of analysis that will predict the magnitude and phase of the signal after it has passed these linear devices in the waveguide is discussed. Scattering and transmission matrices are the usual straightforward methods used. However, when more than two devices are placed in the waveguide, signal flow graphs become a quicker and less cumbersome method of analysis. Therefore, signal flow graphs will be used to compute the voltage transmission coefficient. (Author)

AD-285 638 Div. 8, 2
(TISTP/FR) OTS price $1.10

Institute of Science and Tech., U. of Michigan, Ann Arbor.
AN AUXILIARY INSTRUMENT FOR MONITORING SEISMIC SIGNALS,
by H. J. Bugajski and D. E. Willis. July 62, 4p. incl. illus. (Rept. no. 3649-7-J)
(Contract AF 19(604)6642)
(AFCRL 62-629) Unclassified report

DESCRIPTORS: *Recording systems, Seismic waves.

Signals received from a seismometer are fed into an amplifier set for maximum gain. For this condition, the amplifier was designed so that the higher level signals, likely to be encountered from the seismometer, do not become clipped in the amplifier. The output of the amplifier is rectified and filtered so that the d-c remaining is equal to the peak-to-peak measurement of the a-c waveform. The filtered d-c is then fed to a logarithmic driver which is a vacuum tube balanced bridge across whose output is a nonlinear diode load. The diode compresses the high d-c voltages derived from the signals while leaving the low voltages relatively unaffected, resulting in a somewhat logarithmic response curve. An Esterline-Angus 0-1 milliampere ink recorder is used to record the logarithmically varying d-c voltage levels. (Author)

AD-285 659 Div. 8
(TISTE/CAM) OTS price $3.60

TYCO Labs., Inc., Waltham, Mass.
HIGH Q VARACTOR DIODES.
Quarterly rept. no. 2, 1 June-31 Aug 62.
28 Sep 62, 17p. illus. tables.
(Contract NObsr-87340, Proj. SR-0080301)
Unclassified report

DESCRIPTORS: *Diodes, Gallium compounds, Arsenides, Single crystals, Growth, Packaging, Measurement, Temperature, Design, Electrical properties, Standing wave ratios, Processing, Tests, Voltage, Experimental data, Semiconductors.

The development of low pump power point-contact varactor diodes was continued. Efforts were directed to the following areas: (1) further evaluation of epitaxial GaAs varactors; (2) assembly and refinement of varactors in new package; (3) study and refinement of measurement techniques for high Q varactors; (4) preparation of epitaxial GaAs; (5) characterization of large area abrupt junctions in GaAs with respect to breakdown voltage and capacitance as a function of resistivity; and, (6) initial work on GaP. (Author)

AD-285 678 Div. 8
(TISTE/CAM) OTS price $8.60

Electrical Engineering Research Lab., U. of Illinois, Urbana.
THE COUPLING AND MUTUAL IMPEDANCE BETWEEN BALANCED WIRE-ARM CONICAL LOG-SPIRAL ANTENNAS,
by John D. Dyson. June 62, 82p. incl. illus. refs. (Technical rept. no. 54)
(Contract AF 33(657)8460, Proj. N6278)
Unclassified report

DESCRIPTORS: *Conical antennas, *Coupled antennas, *Helical antennas, Antenna couplers, Antenna radiation patterns, Impedance, Measurement, Design, Theory, Voltage, Electric currents, Rotation, Polarization, Propagation.

A general consideration of the conical log-spiral antenna as a locally periodic, slow wave structure is outlined, and in so doing a quasi-empirical formula for the location of the antenna phase center is developed. This investigation of the mutual impedance between the log-spiral antennas has shown it to be very low. Information on the mutual impedance and on the coefficient of coupling between antennas is supplied for two different geometrical array configurations and for various antenna parameters. Pattern modification due to the presence of parasitic elements was investigated. For element to element spacing of at least one half wavelength, this consists primarily of an increase in beamwidth. Radiation patterns for several arrays are shown. (Author)

AD-285 775 Div. 8, 13
(TISTE/CAM) OTS price $3.60

Eastern Air Devices, Inc., Dover, N. H.
DEVELOPMENT OF TWO HIGH TEMPERATURE BLOWER UNITS.
Interim development rept. no. 8, 2 Dec 60-2 Mar 61,
by S. A. Davis. 2 Mar 61, 13p. illus. table.
(Contract NObsr-77537, Proj. NS 081500-17.6(15))
Unclassified report

DESCRIPTORS: *Blowers, *Cooling fans, Electronic equipment, Bearings, Temperature, Failure (Mechanics), Test methods, Life expectancy, Military requirements, Design, Production.

Two blowers were assembled and evaluated. Parts for two additional units are ready for assembly. Small changes in the nature of manufacturing or design improvements were made. A set of drawings was completed. Of the two assembled units, one was subjected to environmental tests, and the other to life tests. The environmental tests were temperature, altitude, vibration, shock, humidity, and salt-spray. The tests were carried out in sequence on the single sample and met all performance requirements of the specification at the conclusion of the tests. (Author)

AD-285 793 Div. 8
(TISTP/FR) OTS price $1.60

Air Force Cambridge Research Labs., Bedford, Mass.
HOW FAILURE INDICATORS CAN IMPROVE RELIABILITY,
by W. B. Bishop. Jun 62, 12p. incl. illus. 18 refs. (AFCRL 62-361)
Unclassified report

DESCRIPTORS: *Reliability, Electronic equipment.

The fact that a failure has occurred, usually can be detected without a specifically-designed failure indicator. In a complex device, however, many types of failure indicators can be helpful in determining the source of trouble. If reliability is defined to be a measure of the percentage of time a device is operable, then proper design and use of failure indicators can improve reliability. The relationship is shown between the statistical theory of failure indicators and other parts of the reliability literature and develops some of the principles which should be followed in the design and use of failure indicators. As might be expected, a number of these principles were followed by good maintenance men for many years. (Author)

AD-285 800 Div. 8
(TISTP/FR) OTS price $3.60

Directorate of Advanced Systems Planning. Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
A PROBABILISTIC ANALYSIS OF REDUNDANT NETWORKS. 1962, 34p. incl. illus. tables.
Unclassified report

Presented at the 1962 ASD - AFIT Reliability Seminar.

DESCRIPTORS: *Electrical networks, *Circuits, *Reliability, Probability.

Equations are derived which will predicate the reliability of redundant networks. These networks will continue to function even though components have failed. The networks need not be electronic but can be hydraulic, pneumatic or mechanical. The modes of failure will be different but the methodology of evaluating reliability will be the same. For example, hydraulic valves that fail in open or close positions can be treated the same as electronic components which fail in open or short. The necessary probability theory to understand the mechanism of prediction is presented. More concern is with the problems of predicating the reliability of redundant networks than with the problems of getting such networks to function properly. From October 1961 to May 1962, investigations were made to determine the degree of difficulty in designing redundant transistor circuits. A number of design problems exist which must be overcome. The probabilistic approach does lead to extremely reliable designs and this should provide the impetus for the solution of design problems. (Author)

AD-285 865 Div. 8, 25
(TISTP/FR) OTS price $9.60

RCA Industrial Electronic Products, Camden, N. J.
PROJECT LIGHTNING.
Interim research rept. no. 13A, 1 Dec 61-28 Feb 62 on High-Speed Data Processor System Research.
28 Feb 62, 110p. incl. illus. tables.
(Contract NObsr-77523)
Unclassified report

DESCRIPTORS: *Computer logic, *Memory devices, Switching circuits, Resistors, Coaxial cables, Electric connectors.

Further success was experienced using the solid-jacketed miniature coaxial cable in wiring the LIGHTNING Subsystem. Substantial progress was made in evaluation of the plugable wafer connector and in its use. Life test of resistor performance was continued with no new problems arising. Fabrication of all frames for the Logic Subsystem was completed with construction of the memory peripheral registers continuing. The plug-in wafer connector is being used for the first time in this phase. All frames for the Logic Subsystem were tested except the A register which is presently being debugged. Fabrication of the word drivers, digit drivers, and sense amplifiers for the memory subsystem is complete. Three of the four memory planes are completely built and the fourth is 80% complete. (Author)

AD-285 866 Div. 8, 25
(TISTP/FR) OTS price $9.60

RCA Industrial Electronic Products, Camden, N. J.
PROJECT LIGHTNING.
Suppl. to Interim research rept. no. 13A on High-Speed Data Processor System Research.
1 Mar 62, 108p. incl. illus. tables (Suppl. to Interim research rept. no. 13A, AD-285 865)
(Contract NObsr-77523)
Unclassified report

DESCRIPTORS: *Diodes, *Computer logic, *Memory devices, Germanium, Gallium compounds, Arsenides, Rectifiers, Timing circuits, Pulse counters.

AD-285 871 Div. 8, 25
(TISTE/CRJ) OTS price $13.00

Shockley Transistor Corp., Palo Alto, Calif.
STRUCTURAL IMPERFECTIONS IN SILICON P-N JUNCTIONS,
by A. Goetzberger. 15 July 62, 174p. incl. illus. tables, 46 refs. (Scientific rept. no. 2)
(Contract AF 19(604)8060, Proj. 4608)
(AFCRL 62-586) Unclassified report

DESCRIPTORS: *Silicon, *Diodes, Transistors, Electron multipliers, Electric fields, Theory, Statistical analysis, Chemical impurities, Semiconductors, Plasma physics, Electron transitions, Resistance, Diffusion, Crystal structure, Measurement.

New results are presented on avalanche effects in silicon p-n junctions. Multiplication studies on microplasmas, diffusion techniques to obtain junctions with uniform breakdown, and

electrical measurements on uniform junctions are presented. The significant results are: (1) a new method to determine the active area of microplasmas, (2) the highest multiplication factors measured experimentally hitherto, (3) explanation of deviations from the theoretically expected behavior of multiplication at high breakdown by a pulsing mechanism, (4) confirmation of Shockley's theory on uniform breakdown determined by statistical fluctuations of donors and acceptors, (5) discovery of small striations of resistivity (of the order of 1% variation in doping) by light emission of uniform junctions, (6) determination of the breakdown field for silicon with considerably improved accuracy, and (7) linearity of ionization coefficient with electric field. A theoretical treatment is given of multiplication of photocurrents in junctions containing regions of low breakdown voltage (microplasmas). X-ray observations were made on diffusion induced dislocations in silicon. Work was also done on impurity induced pipes through diffused layers. (Author)

AD-285 873 Div. 8, 7, 26
(TISTE/CAM) OTS price $6.60

Western Electric Co., Winston-Salem, N. C.
INDUSTRIAL PREPAREDNESS STUDY LACQUER FILM CAPACITORS.
Quarterly progress rept. no. 14, 25 May-25 Aug 62,
by J. B. Rawls. 25 Aug 62, 62p. incl. illus. tables.
(Contract DA 36-039-sc-81268)
Unclassified report

DESCRIPTORS: *Paper capacitors, *Manufacturing methods, Polymers, Carbohydrates, Electrical properties, Life expectancy, Resins, Temperature, Embedding substances, Metal coatings, Thin films, Quality control, Measurement, Resistance, Tests, Preparation, Production, Chemical properties, Processing.

Effort was concentrated on the most promising polycarbonate resins. More information was obtained on their chemical and physical properties. Accelerated life testing was continued and capacitors impregnated with pepb compound were added to the life test program. Capacitors are being made which show high yields on all electrical characteristics after 50-hour conditioning for all codes. (Author)

AD-285 949 Div. 8, 12
(TISTE/CRJ) OTS price $3.60

Army Signal Research and Development Lab., Fort Monmouth, N. J.
ANALYSIS OF A MINIATURIZED MULTIPOLE FOCUSER FOR A MISSILEBORNE AMMONIA MASER,
by H. G. Andresen, K. D. Moller, and C. Bickart. Apr 62, 33p. incl. illus. table, 11 refs.
(ASRDL Technical rept. no. 2281)
Unclassified report

DESCRIPTORS: *Guided missiles, *Masers, *Miniature electronic equipment, *Frequency, Airborne, Ammonia, Molecules, Microwave oscillators, Electric fields, Mathematical analysis, Focusing, Standards.

Efforts were made to redesign and reduce the dimensions of the focuser structure of an existing missileborne maser system. Some general properties of axially symmetric 2n-pole focusers were reviewed. It is shown that a 4-pole focuser will be superior to other focuser systems provided a small focuser size is the most important design criterion. The dependence of the 4-pole focuser gas flow efficiency on the diameter of the particle source aperture and on the distance between this aperture and the focuser entrance is discussed, and the results are presented. The experiments proved that a specially designed 4-pole focuser having the same length as an 8-pole focuser, used in USASRDL models of the missile-borne maser, increases the maser output power for a focuser rod potential of 15 kv to about 4 db. The output power associated with a 4-pole focuser, having a total length of only 35 mm, was found to be quite adequate for operating the missileborne maser system. (Author)

AD-286 020 Div. 8
(TISTE/CAM) OTS price $7.60

Technische Hochschule, Munich (Germany).
RESEARCH ON ELECTRICALLY SMALL ANTENNAS,
by H. H. Meinke. 28 Feb 62, 54p. incl. illus. 9 refs. (Technical rept. no. 1)
(Contract AF 61(052)506)
Unclassified report

DESCRIPTORS: *Dipole antennas, Antennas, Impedance, Dielectrics, Effectiveness, Magnetic properties, Electric fields, Magnetic fields, Resistance, Attenuation, Mathematical analysis, Differential equations, Theory, Antenna radiation patterns, Measurement, Air.

Research has shown that an improvement of the impedance behaviour of an antenna whose length is very small as compared to the wave length in free space, can be obtained by achieving a greater bandwidth of the antenna. A bandwidth enlargement of the antenna can be obtained by the effect of an additional radiation for the same input voltage. No additional radiation occurs for radiators whose height is smaller than 1/20 the wavelength in air and whose surrounding dielectric also does not extend beyond its height. Additional radiation is obtained by using dielectric with antennas whose height is 1/20 to 1/10 of the wavelength in air. The additional radiation observed was very small. The use of dielectric caused an increase in the inductance and capacitance per unit length of the antenna which is considered as an inhomogeneous line. (Author)

AD-286 033 Div. 8, 25
(TISTP/WH) OTS price $2.60

Brown U., Providence, R. I.
ON THE SOLUTION OF A TRANSCENDENTAL EQUATION ARISING IN THE THEORY OF SCATTERING BY A DIELECTRIC CYLINDER,
by William Streifer and Ralph D. Kodis. June 62, 27p. incl. illus. 17 refs. (Scientific rept. no. 17)
(Contract AF 19(604)4561, Proj. 5635)
(AFCRL 62-598) Unclassified report

DESCRIPTORS: *Radio waves, *Scattering, *Dielectrics, *Cylindrical bodies, *Functions, Integral equations, Series.

AD-286 070 Div. 8, 25
(TISTP/WH) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
EXPLORING THE ANTARCTIC WITH ICE-SOUNDING RADAR,
by Amory H. Waite, Jr. and Stanley J. Schmidt. 1962, 17p. incl. illus. 8 refs.
Unclassified report

Presented at the 1962 Army Science Conference, 20-22 June 1962 at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Ice, *Dielectric properties, *Radar, *Radio waves, Arctic regions, Radar analysis, Propagation.

Gradients of the dielectric constant and loss factor that control radio wave propagation through hard, clear ice, from the surface to depths of several hundred feet, were established during the past five years, at frequencies up to 500 mcs. Thirteen ice-sounding flights were made with helicopter-mounted 400 mc altimeters over a thousand miles of the 200 to 1400 foot thick Antarctic continental ice-shelf in January/February, 1962. Dielectric constant and loss factor gradient calculations were based upon ice depth values previously established by soundwave reflection and by drilling techniques. The radio reflection depths determined agree within three percent with those established by the older procedures down to depths of 900 feet of granular snow (Ne've'). First successful measurements through thick sea-borne ice permitted rapid differentiation between land- and water-borne areas. Two hitherto unknown submarine ridges, the bottom contour of a 3 mile wide glacier, a 4 mile wide island, the first detailed sub-surface profile of the sea-ward melt-edge of the floating shelf, 10 miles of previously hidden coastline, and other minor features were discovered. (Author)

AD-286 095 Div. 8, 2
(TISTP/GRW) OTS price $10.10

Ionosphere Research Lab., Pennsylvania State U., University Park.
A STATISTICAL STUDY OF APPARENT HORIZONTAL IONOSPHERIC MOVEMENTS USING 300 KC/S RADIO WAVES, by Hai-Sup Lee. 1 Oct 62, 122p. incl. illus. tables, refs.
(Scientific rept. no. 170)
(Contract AF 19(604)4563, Proj. 8605 and Grant no. G-14246)
(AFCRL 62-877) Unclassified report

DESCRIPTORS: *Radio waves, *Ionospheric propagation, *Diffraction, Low frequency, Statistical functions, Reflection.

An investigation of the apparent horizontal ionospheric movements in the lower E-region of the ionosphere is described. For the investigation, nighttime observations were made over a period of one year, using the spaced-receiver method, at a frequency of 300 kc on the campus of the Pennsylvania State University. The data obtained from the observations were analyzed using correlation techniques in order to observe the effects of random variations and anisotropy of the diffraction patterns. Experimental results are presented under the two main subjects of the apparent ionospheric movements and the spatial properties of diffraction patterns. The former includes the drift and random velocities; the latter, the axial ratio, tilt angle and structure size of diffraction patterns. The determination of solar semi-diurnal components of the drift velocity is given in detail. (Author)

AD-286 096 Div. 8, 26
(TISTE/JBM) OTS price $4.60

Litton Industries, San Carlos, Calif.
ENGINEERING AND PRODUCTIZATION OF AN INTEGRATED FAMILY OF BACKWARD WAVE OSCILLATORS.
Interim technical engineering rept., 7 Apr-7 July 62,
by James E. Orr and Benjamin V. Valles. Sep 62, 17p. illus. table.
(Contract AF 33(600)43396)
(AMC TR 7-652, vol. 4)
Unclassified report

DESCRIPTORS: *Microwave oscillators, *Backward wave oscillators, *Electron tube oscillators, Life expectancy, Broadband, Temperature, Cooling, Production, Manufacturing methods, Electron tubes, Packaging, Test methods, Standardization, Ultra-high frequency, Super high frequency, Magnets.

Research was continued on a family of electronically tuned, broadband backward wave oscillator tubes. Analysis of band 1, 6 and 8 tubes which have completed life tests are given. This analysis includes design changes which were incorporated in the tubes to improve life performance. Band 1 manufacturing changes are described which result in a tube with better transient frequency behavior and improved operation in high temperature environments. Also, twelve items of general manufacturing improvement which apply to all bands are described. (Author)

AD-286 111 Div. 8
(TISTP/WH) OTS price $5.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NEWS OF THE INSTITUTES OF HIGHER LEARNING-RADIOPHYSICS (SELECTED ARTICLES).
17 July 62, 52p. 26 refs. (Trans. no. FTD-TT-61-91 from Izvestiya Vysshikh Uchebnykh Zavedeniy-Radiofizika, 4:3, pp. 444-475, 1961)
Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Radio waves, *Propagation, *Plasma physics, USSR.

Contents:
The instability of low-frequency electromagnetic waves in a plasma penetrated by a stream of charged particles
The problem of the propagation of electromagnetic waves in a nonequilibrium magnetoactive plasma
Parameter fluctuations of an electromagnetic field propagated through a magnetoactive plasma with random fluctuations of electron density and the magnetic field.

AD-286 132 Div. 8, 25
(TISTP/WH) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE STABILITY OF A FREQUENCY REMOTE CONTROL SYSTEM IN THE PRESENCE OF PULSE NOISE, by Yu. I. Chugin. 10 May 62, 33p. incl. illus. (Trans. no. FTD-TT-62-636 from Avtomatika i Telemekhanika, 23:2, pp. 222-241, 1962)
Unclassified report

DESCRIPTORS: *Remote control systems, *Noise (Radio), *Radio interference, *Frequency modulation, *Band pass filters, *Radio receivers, *Discriminators, Integral equations, USSR.

The stability of a frequency remote control system under the action pulse noise with a known law of amplitude distribution is determined. The influence of the structure and parameters of a receiver upon its noise stability is investigated. A method is examined for calculating the noise stability of codes with series and parallel transmission of subcarriers. The optimum pass band is calculated for a receiver under the simultaneous action of pulsating and fluctuating noise. The effect of the nature of the noise-pulse sequence on stability is examined. (Author)

AD-286 152 Div. 8, 25
(TISTP/WH) OTS price $6.60

Cornell U., Ithaca, N. Y.
AN INVESTIGATION OF ANOMALOUS TRANSHORIZON

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

RADIOWAVE PROPAGATION OVER IRREGULAR TERRAIN,
by R. Cassam. 15 Feb 62, 55p. incl. illus. tables, 12 refs. (Scientific rept. no. 4; Research rept. no. RS 35)
(Contract AF 19(604)3494, Proj. 4603)
(AFCRL 62-570) Unclassified report

DESCRIPTORS: *Radio waves, *Propagation, *Refraction, *Water, *Periodic variations, New York, Lakes, Ultrahigh frequency, Superhigh frequency, Extremely high frequency, Night sky.

The anomalous nighttime propagation of radio waves was studied at frequencies of 9100, 2800, and 840 Mc/s observed on the 108-km path from Rochester to Ithaca, New York. Previously proposed theories that explain anomalous propagation by ducting, reflection, or diffraction fail to explain the irregular behavior studied. Further radio measurements in the form of (1) sampling the 9100-Mc/s signal at 15 sites located along the propagation path, (2) height-gain measurements at 9100 Mc/s at the receiver site, and (3) swinging the 2800-Mc/s antennas 2 deg off the great circle path were undertaken in order to arrive at an explanation of the phenomenon. Finally, a theory based on the formation of elevated superrefractive layers situated over two lakes crossing the path is proposed to explain the anomalous propagation. (Author)

AD-286 155 Div. 8
(TISTE/JBM) OTS price $2.60

Traveling Wave Tube Product Section, General Electric Co., Palo Alto, Calif.
35-KMC BEAM INTERACTION STUDY.
Interim engineering rept. no. 2, 20 June-20 Sep 62,
by C. E. Enderby and R. M. White. 28 Sep 62, 18p. incl. illus. (Rept. no. TIS R62ELM 233-2)
(Contract AF 33(657)8360, Proj. 4156)
Unclassified report

DESCRIPTORS: *Traveling wave tubes, *Electronic circuits, Waveguide joints, K band, Extremely high frequency, Electron guns, Propagation, Waveguides, Electric fields, Magnetic fields, Impedance, Electron beams, Fourier analysis, Waveguide couplers, Temperature, Tests, Magnetrons, Standing wave ratios, Test equipment.

Research continued on ring-plane slow wave circuits for use with high-perveance beams in traveling-wave tubes capable of operating above 35 kmc. A brief summary is given of the propagation characteristics and interaction impedance for the ring-plane slow-wave structures. Various structures for coupling energy into ring-plane circuits from conventional transmission lines are described. Electron guns for use in hot testing of these circuits are discussed. (Author)

AD-286 157 Div. 8
(TISTE/CRJ) OTS price $2.60

Microwave Associates, Inc., Burlington, Mass.
SOLID STATE S AND X BAND LIMITERS.
Quarterly progress rept. no. 1, 30 Mar-30 June 62,
by Robert Tenenholtz. Sep 62, 12p. illus.
(Contract NObsr-87307, Proj. SR0080301)
Unclassified report

DESCRIPTORS: *Limiters, *Diodes, Microwave frequency, S band, X band, Microwave equipment, Semiconductors, Solid state physics, Theory.

Research concerns the investigation of methods leading to the design of solid state microwave limiters employing PN junctions at S and X band. The characteristics of the PN junction package and general microwave limiter circuits were reviewed. The diode package equivalent circuit for various PN junction (varactor) characteristics at both X and S band was calculated. In addition, its interaction with a proposed microwave circuit configuration is discussed. Also covered are initial experimental results at X band on a promising coaxial stub microwave type circuit. This includes data on the circuit itself in addition to initial low power X band limiter test results. (Author)

AD-286 174 Div. 8
(TISTE/CAM) OTS price $1.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
MINIMIZING OF INCOMPLETELY SPECIFIED SEQUENTIAL SWITCHING CIRCUITS,
by Zvi Kohavi. 10 May 62, 11p. incl. illus. tables, 3 refs. (Rept. no. PIBMRI-1019-62)
(Contract AF 19(604)6620)
(AFCRL 62-713) Unclassified report

DESCRIPTORS: *Switching circuits, *Sequence switches, Electronic circuits, Theory, Sequences, Tables.

Given a flow-table of a sequential switching function which is not completely specified, a method for reducing the number of states in the flow-table is developed. The method eliminates the need to find all the maximal compatibles in order to get the simplest flow-table, and it simplifies the technique of finding the maximal compatibles. A graphical method is developed to simplify the search for the compatibles that will give a simple flow-table. Even though this method was developed for incompletely specified sequential switching functions, it can be applied to completely specified sequential functions, where it simplifies the technique of reducing the number of states in the flow-table. (Author)

AD-286 178 Div. 8, 25
(TISTP/WH) OTS price $7.60

Remington Rand Univac Div., Sperry Rand Corp., Philadelphia, Pa.
MATHEMATICAL CIRCUIT ANALYSIS AND DESIGN.
Final rept.,
by Albert Brown and Philip J. Mullock. Mar 62, 69p. incl. illus. table, 10 refs.
(Contract AF 19(604)5189, Proj. 5633)
(AFCRL 62-317) Unclassified report

DESCRIPTORS: *Electronic circuits, *Numerical methods and procedures, *Integration, *Statistical analysis, *Mathematical analysis, *Design, Digital computers, Programming, Partial differential equations, Inverter circuits.

A number of new techniques were investigated for the mathematical analysis and design of electronic circuits. These techniques were tested on several new devices, and variants of the inverter circuit were examined in more detail. The investigations described are divided into two parts, statistical and other computational methods (Part II), and analytical studies (Part III). (Author)

AD-286 179 Div. 8, 25
(TISTE/CAM) OTS price $3.60

Westinghouse Electric Corp., Baltimore, Md.
RESEARCH ON MILLIMETER FERROMAGNETIC TYPE PARAMETRIC AMPLIFIER.
Quarterly progress rept. no. 2, 1 May-31 July 62,
by Robert A. Moore, Denis C. Webb, and John D. Cowlishaw. 31 July 62, 34p. incl. illus. (Rept. no. 407A2; rept. no. 6)
(Contract DA 36-039-sc-89071)
Unclassified report

DESCRIPTORS: *Parametric amplifiers, *Ferromagnetic materials, *Traveling wave tubes, Cavity resonators, Propagation, Ferrites, Experimental data, Wave transmission, Magnetic fields, Partial differential equations, Equations, Motion, Ferromagnetism, Measurement, Test methods, Extremely high frequency, Microwave amplifiers.

The dispersion was measured on a resonant rod section across the narrow dimension of the waveguide. Good correlation was found with the mode for which the computed and experimental data overlaps. The dispersive response was computed for a range of conditions at 4 mm. also for H less than Ho. These data are presented in the form of curves with frequency and rod diameter as parameters. A cavity was constructed to resonate at 69.1 kmc, corresponding to the frequency of the pump source now available. The frequency range for which reliable linewidth measurements can be taken was extended well into the region for which propagation effects are significant. The extension was achieved by combining the resonant reaction techniques with a method for varying the degree of coupling. Some sample measurements are reported. The effect of propagation on the dispersion of the magnetostatic mode spectrum is being charted. The correspondence of the uniform precessional mode with a second order correction for propagation effects is reasonably good. (Author)

AD-286 195 Div. 8
(TISTP/TL) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AN APPROXIMATE STUDY OF SELFOSCILLATIONS IN A NONLINEAR TWO-CHANNEL AUTOMATIC CONTROL SYSTEM.
by M. V. Starikova. 6 June 62, 13p. incl. illus. 4 refs. (Trans. no. FTD-TT-62-833 from Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Energetika i Avtomatika, No. 1, pp. 116-125)
Unclassified report

DESCRIPTORS: *Control systems, *Nonlinear systems, Automatic, Oscillation, Circuits, Operators (Mathematics), Harmonic oscillators, Feedback, Amplifiers.

A study was made of selfoscillations in a complex multicircuit automatic control system of an arbitrary order containing two nonlinear parallel circuits. The systems under consideration belong to a class of systems in which the number of controlling organs is greater than the number of parameters to be controlled. The method of harmonic linearization allows the conditions for the existence of selfoscillations in the system to be determined, the effect of the parameters of the system to be evaluated, and a number of other problems to be solved. (Author)

AD-286 196 Div. 8
(TISTE/CAM) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A ROTARY COUPLING FOR A MILLIMETER-WAVE R-F CHANNEL,
by E. M. Guttsayt. 17 July 62, 4p. incl. illus. (Trans. no. FTD-TT-62-648 from Soviet Patent No. 138278 (642919/40), 3 Nov. 1959)
Unclassified report

DESCRIPTORS: *Waveguide couplers, Radio-frequency transformers, Dielectrics, Extremely high frequency, Coupling circuits, Voltage, Wave transmission, Translation.

In the proposed coupling for a millimeter-wave R-F channel, an H-shaped metal-dielectric waveguide, which is excited under longitudinal-wave conditions, is used. The rotary coupling is accomplished by using the 90-degree cross section of the metal-dielectric waveguide, which is fitted with a metal corner reflector having an aperture, which serves for coupling between the metal-dielectic and circular waveguides. Power is fed to the arm and after reflection strikes the arm, for all practical purposes without loss. In order to increase the coupling between the H-shaped and circular waveguides, an exciting stretcher is placed along the axis of the circular waveguide, just as in the rotary switch used in the ordinary rectangular waveguide. The rotary coupling described is suitable for operation in a narrow waveband. In order to widen the band of the rotary coupling, it is necessary that the short circuit be located immediately at the cross section. (Author)

AD-286 204 Div. 8, 30
(TISTP/TL) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A METHOD FOR AUTOMATIC OPTIMIZATION OF AUTOMATIC-CONTROL SYSTEMS AND A DEVICE FOR ITS REALIZATION,
by S. A. Doganovskiy. 20 July 62, 5p. incl. illus. (Trans. no. FTD-TT-62-760 from Soviet Patent No. 141682 (690269/26), 22 Dec 1960)
Unclassified report

DESCRIPTORS: *Control systems, Automatic, Computers, Data processing systems, Statistical functions, Noise, Errors, Measurement, Stability.

The method of automatic optimization of systems of automatic control is distinguished by the fact that, with a view to increasing the noise stability of an automatic control system subject to random disturbances, automatic optimization of the system is carried out according to the statistical measure of error of the controlled value by means of automatic search for values of a number of controlling actions on the object and for time-lag values of the correlation functions at which the formulated statistical measure of error is minimized. The device for realizing the method is distinguished by the fact that it contains a computer for the statistical processing of data concerning processes in the object and for the formation of the statistical measure of error of the controlled value. It also contains an automatic multichannel optimizer, at the input of which enter the output signal from the computer and the value of the permissible limitations of the variables of the object. (Author)

AD-286 217 Div. 8
(TISTE/JBM) OTS price $1.60

Watkins-Johnson Co., Palo Alto, Calif.
APPLIED RESEARCH ON TECHNIQUES FOR LIGHT MODULATION DETECTION.
Interim engineering rept. no. 1, 1 July-30 Sep 62,
by S. E. Sobottka and R. Frost. 30 Sep 62, 15p. incl. illus. 5 refs. (Rept. no. W-J 62-610R4) (Contract AF 33(657)8996)
Unclassified report

DESCRIPTORS: *Phototubes, *Microwave equipment, *Traveling wave tubes, Microwaves, Electron guns, Light, Modulation, Cathodes (Electron tubes), Modulator tubes, Detectors, S band, Cesium, Oxygen electrodes, Oxygen, Photosensitivity, Silver, Silver electrodes, Electron beams, Magnetic fields, Electrostatic fields, Electron lenses, Focusing, Diodes, Films, Test equipment, Processing.

Research was conducted on the development of a high-sensitivity microwave phototube. Fabrication of efficient photocathodes and the development of a convergent electron gun was emphasized. Efforts were devoted to preliminary design and preparation. Items designed were deposition tubes for forming photocathodes, a convergent gun beam tester, a complete microwave phototube, and a modulated-light test bench. Apparatus constructed includes light transmission measurement apparatus for monitoring cathode film thicknesses, and vacuum station apparatus for cathode fabrication. (Author)

AD-286 242 Div. 8, 6
(TISTE/JBM) OTS price $1.10

Hallicrafters Co., Chicago, Ill.
ANTENNA QRC-158-4(T).
Monthly progress rept. no. 4, 10 July-10 Aug 62. 10 Aug 62, 3p. (Rept. no. 094-903301)
(Contract AF 33(604)40356)
Unclassified report

DESCRIPTORS: *Antennas, *Radar antennas, Tests, Shock resistance, Standing wave ratios, Vibration, Production.

AD-286 251 Div. 8, 26
(TISTE/CAM) OTS price $1.60

Union Thermoelectric Div., Comptometer Corp., Niles, Ill.
ULTRAMINIATURE MILITARY QUARTZ CRYSTAL UNITS.
Quarterly progress rept. no. 8, 15 Mar-14 June 62,
by Len A. Tyler. 14 June 62, 14p. incl. tables.
(Contract DA 36-039-sc-85348, Proj. 3A99-15-001-02)
Unclassified report

DESCRIPTORS: *Quartz crystals, *Quartz resonators, *Microminiaturization (Electronics), High frequency, Very high frequency, Measurements, Crystal holders, Frequency shift, Production, Design, Seals, Bonding, Metal-glass adhesives.

Ultraminiature resonators meeting the Q requirement of 10,000 were fabricated at various frequencies down to 10.7 mc with plano-convex plates and 9.4 mc with bi-convex plates. Measurements of the frequency shift experienced by ultraminiature resonators during the sealing operation indicate that the change is not excessive, averaging about 10 parts per million upward. (Author)

AD-286 292 Div. 8, 25
(TISTE/CRJ) OTS price $7.60

Electron Tube Research Lab., U. of Minn. Minneapolis.
STUDIES OF PRIMARY ELECTRON SOURCES.
Scientific rept. no. 3, 1 Sep-1 Dec 61,
by D. E. Anderson. Aug 62, 44p. incl. illus. tables, refs.
(Contract AF 19(604)8381, Proj. 4619)
(AFCRL 62-597) Unclassified report

DESCRIPTORS: *Thermionic emission, *Oxide cathodes, *Cathodes (Electron tubes), *Superconductors, Alkaline earths, Semiconductors, Barium compounds, Oxides, Aluminum compounds, Tantalum compounds, Tantalum, Photoemission, Life expectancy, Anodes (Electron tubes), Photoelectric effect, Temperature, Electron tubes.

An experiment in which oxygen and hydrogen were admitted to a tube containing an active-based oxide cathode is described. The admission of oxygen poisoned the cathode early in life and permanently reduced the emission by an order of magnitude. Operation at an elevated temperature and a complete reconversion to 1323 K did not change the emission. Hydrogen was admitted at low pressures and caused small changes in the emission. The problem of evaporative cooling in an oxide cathode during current drain was analyzed. Further data on the photoelectric yield and thermionic pulse emission from BaO cathodes produced by converting $BaCO_3$ are presented. The time-temperature dependence of the photoelectric yield following a life period on a cathode is discussed. Measurements of tunnel current through Al_2O_3-Al samples are discussed. Results of tunnel current measurements on thin film Ta-Ta_2O_5-metal devices are described. Measurements were made on samples having active areas with Al and also with Au overlayers. Further data are presented on the enhanced electron emission from a superconducting field emitter which occurs when the transition from superconducting to normal state is approached. (Author)

AD-286 304 Div. 8
(TISTP/FR) OTS price $6.60

New York U. Coll. of Engineering, N. Y.
TWO CLASSES OF CODES FOR IMPROVING FEEDBACK COMMUNICATION EFFICIENCY,
by J. J. Metzner. 15 June 62, 55p. incl. illus. tables, 12 refs. (Scientific rept. no. 10)
(Contract AF 19(604)6168, Proj. 4610)
(AFCRL 62-525)
Unclassified report

DESCRIPTORS: *Information theory, Feedback, Errors, Coding.

Some general properties of codes in a high-reliability decision feedback system first are discussed briefly. Two particular classes of codes are then studied to determine their ability to improve system efficiency by allowing greater error correction while maintaining reliability. Hobbs' codes are analyzed with respect to reliability and complexity for correction of single-, double-, triple-, and partial four-error correction. A class of burst-error correcting codes with a somewhat random structure is then described, together with a reasonably simple decoding which allows correction of all bursts of length up to somewhat less than half the number of check digits. (Author)

AD-286 305 Div. 8
(TISTE/CAM) OTS price $3.60

New York U. Coll. of Engineering, N. Y.
STUDY OF SHORT TERM STABILITY OF CRYSTAL OSCILLATORS.
Final rept., 1 July 61-30 June 62,
by L. Saporta and G. Weiss. 30 June 62, 36p. incl. illus. 7 refs. (Rept. no. 8)
(Contract DA 36-039-sc-87450, Proj. 3A-99-15-001-02-23)
Unclassified report

DESCRIPTORS: *Crystal oscillators, *Feedback oscillators, Frequency stabilizers, Model tests, Signal-to-noise ratio, Measurement, Mathematical analysis, Linear systems, Nonlinear systems, Radiofrequency amplifiers, Tuned circuits.

A study is described of the effects of noise on the r.m.s. frequency deviation of an oscillator. Several models are assumed. In one case the noise and signal are linearly added and the assumption is made that the noise does not enter the feedback loop of the oscillator. It is shown that this predicts an inverse first power variation of the r.m.s. frequency deviation with respect to the integration time inherent in the

frequency measurement. In other models, the noise is included in the feedback loop and results in an inverse one-half power variation. Evidence is adduced to indicate that both effects take place in practical oscillators and some estimates of the magnitude of these effects are made. (Author)

AD-286 307 Div. 8, 26
(TISTE/JBM) OTS price $3.60

Pacific Semiconductors, Inc., Lawndale, Calif.
INTERDIGITATED SILICON TRANSISTOR PROGRAM.
Interim technical engineering rept., 19 June-18 Sep 62,
by B. Rappaport. Oct 62, 21p. illus.
(Contract AF 33(600)43029)
(ASD TR 7-850, vol. 4)
Unclassified report

DESCRIPTORS: *Transistors, *Semiconductors, *Manufacturing methods, Silicon, Vapor plating, High frequency, Very high frequency, Electrolytic polishing, Gases, Hydrogen, Crystals, Growth, Processing, Electrodes, Gas diffusion, Silicates, Packaging, Production, Test equipment, Materials, Voltage, Tests, Electric currents.

Work continued on manufacturing techniques and processes for silicon power transistors. A new process for the fabrication of planar structures was developed which yields high voltage breakdowns and low collector-base reverse leakage currents. A production prototype epitaxial reactor was built. Two-10 and 3-20 transistors were made by a new process in which the base predeposition layer is deposited over the entire wafer and then removed from the desired collector surface prior to the base diffusion. Development of an electrochemical polishing process is in the final stages. Construction of a production prototype epitaxial reactor was completed. A vapor deposition process for the base predeposition operation was established, and the equipment constructed. Crystal mount and lead attachment operations were developed, and the pilot equipment is under construction. A superstructure for base and emitter connections in the 4-50 and 5-100 devices was designed and tested. Voltage breakdown and current leakage tests were made. (Author)

AD-286 308 Div. 8
(TISTP/WH) OTS price $6.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
GUIDED COMPLEX WAVES: PART I. FIELDS AT AN INTERFACE.
by T. Tamir and A. A. Oliner. 21 Mar 62, 39p. illus. 42 refs. (Research rept. no. PIBMRI-1008-62)
(Contract AF 19(604)7499, Proj. 4600)
(AFCRL 62-166) Unclassified report

DESCRIPTORS: *Wave transmission, *Waveguides, *Wave characteristics, *Radio waves, *Propagation, Electromagnetic fields.

AD-286 324 Div. 8
(TISTE/CRJ) OTS price $6.60

RCA Industrial Tube Products, Lancaster, Pa.
THE DEVELOPMENT OF AN AUXILIARY ELECTRODE THERMIONIC CONVERTER.
Quarterly technical rept. no. 3, 15 June-15 Sep 62,
Oct 62, 63p. incl. illus. tables.
(Contract AF 33(657)8005, Proj. 3145)
Unclassified report

DESCRIPTORS: *Thermionic emission, *Generators, *Electric power production, Cesium, Materials, Processing, Electrodes, Life expectancy, Ceramic materials, Voltage, Electric currents, Airborne, Nickel, Helium, Chemical impurities, Gases, Space environmental conditions, Metals, Ions.

Research was continued in an effort to determine the feasibility and to demonstrate the practicality of a three-electrode thermionic converter having the following characteristics: (a) a third, positive ion-producing electrode, (b) an efficiency of not less than 15%, (c) an unattended life of not less than 1 year, and (d) a maximum temperature of 1500 K. Several experimental converter designs were fabricated and evaluated. Refinements in geometry and processes were tested to achieve more dependable design criteria with the greatest emphasis directed toward the improvement in Cs purity. Materials investigations completed the Cs compatibility data for the initial materials selected and a comprehensive report is included. (Author)

AD-286 326 Div. 8
(TISTP/WH) OTS price $5.60

Microwave Lab., Stanford U., Calif.
CYCLOTRON RESONANCE INTERACTION AT MILLIMETER WAVELENGTHS.
Technical rept.,
by K. K. Chow. Aug 62, 46p. incl. illus. 21 refs. (Scientific rept. no. 43; ML rept. no. 918)
(Contract AF 19(604)1930, Proj. 4619)
(AFCRL 62-582) Unclassified report

DESCRIPTORS: *Cyclotrons, *Extremely high frequency, *Backward-wave oscillators, *Resonance, *Magnetic fields, Microwaves.

Cyclotron resonance interaction between an electron beam and a circuit wave to produce backward wave oscillation in an unloaded waveguide in the S-band was investigated, and the development of a prototype oscillator tube to work in the 6-4.5 mm range was also completed. This prototype tube was so constructed that it could be placed in a narrow air gap of an iron-core electromagnet which provided the necessary field for electron cyclotron motion. However, it did not have the desired performance. Modifications made on the prototype tube and tube performance after modification are described. A different design is also reported. The main difficulty encountered in improving tube performance was the inability to control electron injection properly. Even at the conclusion of the experimental work described here, the control was not entirely satisfactory, though net electronic gain from the tube was obtainable. A secondary difficulty was the lack of space in which to place the tube components; however, this was later solved. (Author)

AD-286 333 Div. 8, 16
(TISTB/AW) OTS price $9.60

Hughes Aircraft Co., Culver City, Calif.
MICROMINIATURIZED INSTRUMENTATION PACKAGE.
Report on Phase 3,
by A. B. Ellis, J. A. McKenzie, and C. A. Stabolepszy. 27 Aug 62, 115p. incl. illus. tables, 184 refs.
(Contract AF 04(611)6344)
Unclassified report

DESCRIPTORS: *Instrumentation, *Space medicine, *Astronautics, Microminiaturization, Monitors, Space flight, Transducers, Radio signals, Measurement, Physiology, Man.

The development, design and fabrication work for three Micro-Miniaturized Instrumentation Packages

are described. This report documents the work done during Phase III, and also summarizes the material contained in the reports published upon completion of Phase I and Phase II. The summarization gathers the most important material into one volume, and provides ready reference to the contents of the previous reports. The general intent of this program was to provide improved techniques and equipment for making measurements of relatively well known parameters defining human physiological condition. These measurements were to be made in unusual situations, such as high performance aircraft, near-space vehicles, and in space simulation chambers. (Author)

AD-286 363 Div. 8
(TISTE/CRJ) OTS price $1.60

Inter-Range Instrumentation Group, White Sands Missile Range, N. Mex.
SPECIFICATIONS FOR VLF RECEIVER/COMPARATOR SYSTEM.
Sep 62, 8p. (IRIG Document no. 108-62)
Unclassified report

DESCRIPTORS: *Frequency, *Radio receivers, *Time, Very low frequency, Specifications, Electrical properties, Physical properties, Sensitivity, Stability, Radiofrequency amplifiers, Phase detectors, Servo systems, Standards, Synchronizers.

The technical specification outlines the requirements for the fabrication of a VLF receiver/comparator system. This equipment will be used to maintain time synchronization between widely separated timing stations to within ± 1 millisecond, and to assist in maintaining standard frequencies (with respect to transmitted UT-2) to an accuracy of ± 2 parts in 10 to the 10th power or better. (Author)

AD-286 365 Div. 8
(TISTE/CRJ) OTS price $3.60

Microwave Lab., Stanford U., Calif.
GENERAL STUDIES IN HIGH-POWER MICROWAVE CONCEPTS.
Quarterly rept. no. 20 (Final) 1 Apr 57-31 May 62,
by Marvin Chodorow. Sep 62, 16p. incl. illus. refs. (Scientific rept. no. 44; ML rept. no. 939)
(Contract AF 19(604)1930, Proj. 4619)
(AFCRL 62-730) Unclassified report

DESCRIPTORS: *Electron guns, *Parametric amplifiers, *Plasma physics, *Electron tubes, Electron beams, Cesium, Microwave equipment, Electromagnetic waves, Propagation, Electrostatics, Focusing, Magnetic fields.

Contents:
Microwave tube studies
Crossed-field electron guns
Electrostatic beam-type parametric amplifier
Plasma physics studies
Electron beam interaction with a plasma
Plasma parametric amplifier
Electron beam interaction with a cesium plasma
HF diagnostic techniques for plasmas

AD-286 375 Div. 8, 2
(TISTP/WH) OTS price $4.60

Queensland U. (Australia).
THE SCINTILLATION OF SATELLITE RADIO TRANSMISSIONS AND FIELD-ALIGNED IONOSPHERIC IRREGULARITIES,
by D. G. Singleton, G. J. E. Lynch, and J. A. Thomas. Sep 61, 19p. incl. illus. tables, 23 refs. (Scientific rept. no. 2)
(Contract AF 64(500)9, Proj. 5631)
(AFCRL 62-302) Unclassified report

DESCRIPTORS: *Radio signals, *Satellite vehicles, *Ionosphere, *Propagation, *Statistical analysis, *Terrestrial magnetism, Australia.

Three months' observations obtained at Brisbane of the scintillations of the 20 Mc/s transmissions from Explorer VII were analyzed in detail. The scintillations have a Gaussian distribution of amplitude and a scintillation rate which peaks at 2 c/s. The phenomenon is mainly a night-time one but some slight activity persists into the daylight hours. There is no evidence of a correlation with sporadic E but the scintillations are found to be associated with both the frequency-spreading and range-spreading types of spread-F. The scintillation activity is found to increase with zenith angle in a manner which can be interpreted in terms of the same system of irregularities, at heights of the order of 200 to 600 km., producing both the scintillations and spread-F. The irregularities are shown to be field-aligned and to have dimensions of the order of 1 km. The irregularities associated with frequency-spreading are found to occur in patches with horizontal dimensions of the order of 100 km. or more. (Author)

AD-286 376 Div. 8, 2
(TISTP/WH) OTS price $2.60

Queensland U. (Australia).
THE GEOMETRY OF RADIO REFLECTIONS FROM FIELD-ALIGNED IONIZATION IRREGULARITIES IN THE IONOSPHERE,
by E. W. Dearden. Oct 61, 13p. incl. illus. 11 refs. (Scientific rept. no. 3)
(Contract AF 64(500)9, Proj. 5631)
(AFCRL 62-303) Unclassified report

DESCRIPTORS: *Radio waves, *Reflection, *Ionosphere, *Geometry, *Ionization, *Terrestrial magnetism.

Chapman's Auroral Geometry (J. Atmos. Terr. Phys.) is generalized for an arbitrary angle of incidence of a radio wave on a geomagnetic field line. A method for dealing with refraction is described; in this case the results are illustrated by describing the echo surfaces for a transmitter located at Brisbane. (Author)

AD-286 377 Div. 8, 2
(TISTP/WH) OTS price $7.60

Queensland U. (Australia).
INSTRUMENTATION FOR THE OBSERVATION OF FIELD-ALIGNED F REGION IRREGULARITIES AND TRANS-EQUATORIAL RADIO PROPAGATION,
by J. A. Thomas and R. W. E. McNicol. Feb 62, 75p. incl. illus. 9 refs. (Scientific rept. no. 5)
(Contract AF 64(500)9, Proj. 5631)
(AFCRL 62-305) Unclassified report

DESCRIPTORS: *Test facilities, *Radio equipment, *Radio waves, *Ionosphere, *Propagation, Australia, Instrumentation.

A brief description is given of the general facilities available at the Field Station and this is followed by a more detailed analysis of certain specialised equipment developed during the present Contract. The main units discussed are: (1) a 16 Mc/s rotatable back-scatter sounder; (2) a 55 Mc/s rotatable back-scatter sounder; and (3) a 15-30 Mc/s rotatable back-scatter sounder. Information is also given regarding the methods used to obtain amplitude, pppolarisation, phase-path, and angle-of-arrival measurements of back-scatter echoes, and of scintillation data from satellite radio signals. (Author)

AD-286 379 Div. 8, 2
(TISTP/WH) OTS price $5.60

Queensland U. (Australia).
PRELIMINARY SURVEY OF RESULTS OF OBSERVATIONS OF FIELD-ALIGNED IRREGULARITIES FROM BRISBANE,
by Evelyn M. Matthew. Nov 61, 27p. incl. illus. tables, 31 refs. (Scientific rept. no. 4)
(Contract AF 64(500)9, Proj. 5631)
(AFCRL 62-304) Unclassified report

DESCRIPTORS: *Radio signals, *Ionosphere, *Scattering, *Statistical analysis, *Terrestrial magnetism, Australia.

Preliminary results of an investigation into aspect-sensitive reflections from field-aligned irregularities, undertaken at Brisbane, are discussed. Such echoes were seen to occur at nighttime in the direction of geomagnetic south, with either a U-shape or a patchy appearance. The peak of the diurnal occurrence was at local midnight. The fading rate was generally faster than that of ground back-scatter echoes. Echo durations were usually of the order of 2 hours. The range distribution had a peak of occurrence between 1500 and 1700 km virtual slant range from Brisbane. Range spread along the 180 deg geomagnetic meridian was usually between 100 and 150 km; apparent speeds of motion along this meridian were most commonly less than 200 km/hour. Northwards motion predominated before local midnight and southwards after this time. The mean azimuths of observed echoes showed a westward deviation with increasing time, due to ionospheric effects, and also a westward deviation with decreasing range. Possible correlation existed between echo occurrence, radio-star scintillations and spread F. Some magnetic control of echo occurrence and behavior was observed. (Author)

AD-286 391 Div. 8
(TISTE/JBM) OTS price $3.60

Remington Rand Univac Div., Sperry Rand Corp., Philadelphia, Pa.
LOW POWER THIN MAGNETIC FILM MEMORY.
Interim engineering rept. no. 2, 5 July-5 Oct 62.
5 Oct 62, 31p. incl. illus. tables, 4 refs.
(Contract AF 33(657)8679)
Unclassified report

DESCRIPTORS: *Thin films, *Memory devices, *Metal films, Magnetic alloys, Magnetic coatings, Nickel alloys, Silicon compounds, Noise, Transistors, Diodes, Transformers, Ferrite cores, Electronic circuits, Magnetic properties, Microminiaturization (Electronics), Copper, Electric connectors.

Work continued on the study of the feasibility of operating a magnetic thin film memory with currents of approximately 20 ma. The objective is to be achieved by reducing the magnetic film and drive wire size and by using films with very low values of anisotropy field. Unilloy I films with low dispersion but slightly higher anisotropy field being used. A new and more accurate mask changer was completed and several five mil circuits were fabricated. Several four layer sandwiches were fabricated. The reduction is sample size to five mills reintroduced the connector problem, but satisfactory connections to the thin film lines were made by thermal-compression-bonded gold wires. The use of deposited thin film active and passive elements was proposed as a solution to the connection problems for a large matrix. An effort is being made to develop low impedance drivers. Several twenty mil and five mil samples were tested. Outputs of several millivolts were obtained from the five mil circuitry samples at a drive of 200 ma. The large output and drive current are due in large part to the use of thick films. (Author)

AD-286 394 Div. 8
(TISTE/CAM) OTS price $3.60

CBS Labs., Stamford, Conn.
RESEARCH AND DEVELOPMENT OF SOLID STATE TUNNEL DEVICES AND ARRAYS CAPABLE OF OPERATION AT MICROWATT POWER LEVELS.
Interim development rept. no. 1,
1 June-31 Aug 62.
2 Oct 62, 19p. illus. tables, 20 refs.
(Contract NObsr-87512)
Unclassified report

DESCRIPTORS: *Diodes, *Semiconductors, Feasibility studies, Processing, Solid state physics, Electron beams, Voltage, Electric currents, Space charges, Theory, Evaporation, Diffusion, Chemical impurities, Probability, Aluminum, Silicon, Germanium, Gallium compounds, Arsenides, Resistance, Electrostatic capacitance, Measurement, Alloys.

A survey of the present state of the theoretical research on tunnel diodes is presented. Experiments aimed at forming extremely small tunnel junctions in silicon are reported. Two approaches are pursued: (1) alloying a relatively large contact area through an extremely shallow n^+ layer on a p type base; (2) alloying the relatively large contact areas through small holes in an oxide mask on the silicon. (Author)

AD-286 460 Div. 8
(TISTE/JBM) OTS price $10.50

Electron Physics Lab., U. of Michigan, Ann Arbor.
RESEARCH ON CROSSED-FIELD ELECTRON DEVICES.
Semiannual progress rept. no. 11, 1 Dec 61-1 June 62,
by N. A. Masnari, J. E. Rowe and others. June 62, 120p. incl. illus. tables (Rept. no. 2854-†6-P)
(Contract DA 36-039-sc-78260, Proj. 3-99-15-104)
Unclassified report

DESCRIPTORS: *Electron guns, *Electron beams, *Microwave amplifiers, Digital computers, Programming, S band, Space charges, Brillouin zones, Amplifiers, Electric fields, Noise (Radio), Density, Electrons, Microwaves, Measurement, Nonlinear systems, Focusing, Electromagnetic fields, Propagation, Numerical methods and procedures, Tests, Temperature, Mathematical analysis.

Research on crossed-field electron devices continued. A new digital computer program for solution of the nonlinear crossed-field device equations is outlined and representative solutions for the S-band amplifier are presented. The effects of spacecharge fields in the S-band amplifier are evaluated. The studies of maximum beam convergence in crossed-field devices are extended and the range of anode voltages for which Brillouin flow can be maintained in the interaction region is determined. A theoretical analysis of phase focusing in M-type amplifiers is made indicating that beam kinetic energy can be converted to RF energy if the circuit phase velocity and interaction region electric field are properly varied. The Llewellyn-Peterson equations and density function equations are solved and discussed relative to noise transport in several models of crossed-field electron guns. (Author)

AD-286 536 Div. 8, 6
(TISTE/JBM) OTS price $1.60

Electronic Communications, Inc., Timonium, Md.
PROTOTYPE HIGH POWER CIRCULATOR.

Interim engineering rept., 20 Apr-20 July 62. 20 July 62, 4p. incl. illus.
(Contract NObsr-87394)

Unclassified report

DESCRIPTORS: *Transmission lines, *Radar equipment, Waveguides, Ultra high frequency, Cooling, Electromagnets, Ferroelectric materials, Coaxial cables, Electric connectors, Packaging, Electric switches, Temperature, Impedance matching.

Work was continued on the design of a high power Y-circulator in the UHF region. The complete package is contained in a space of 24 x 19 x 24 in. with the front panel suited for mounting in a 19 in. relay rack. Individual components for the circulator system are described. (Author)

AD-286 538 Div. 8, 25
(TISTM/ODN) OTS price $11.00

Martin-Marietta Corp., Baltimore, Md.
INVESTIGATION OF ELECTRONIC INSTRUMENTATION AT LIQUID NITROGEN TEMPERATURE,
by J. S. Hildum, J. A. H. Jacobs, and R. J. Allen. 20 Aug 62, 150p. incl. illus. tables, 113 refs. (Rept. no. ER 12518)
(Contract AF 30(602)2702, Proj. 4519)
(RADC TDR 62-425)

Unclassified report

DESCRIPTORS: *Instrumentation, *Thin films, *Carbon resistors, Capacitors, Transistors, Liquefied gases, Crystals, Cryogenics, Paper capacitors, Nitrogen, Bibliography, Diodes, Silicon, Thermal conductivity, Thermal radiation, Thermal insulation, Dielectrics, Tests, Carbon, Alloys, Nickel alloys, Metal films, Electronics, Low-temperature research.

The status of the investigation of the effects of liquid N temperature upon the operation of electronic instrumentation is described. The testing of components included C thin-film, C composition, and Ni alloy thin-film resistors; paper capacitors, silicon diodes and field effect transistors. Studies of supporting equipment, i.e., N liquefiers and cryostats, and the techniques of handling liquid were included. A literature survey was conducted and its results are summarized. Additional details may be found in the bibliography at the end of this report. A short summary of the effects of cooling upon the conductivity of conductors and semiconductors is included. Application of this theory to diode and transistor operations is made. (Author)

AD-286 556 Div. 8, 26
(TISTE/CAM) OTS price $2.60

Sprague Electric Co., North Adams, Mass.
PRODUCTION ENGINEERING MEASURE RELIABILITY IMPROVEMENT JET ETCH TRANSISTOR.
Quarterly rept. no. 1, 30 Apr-31 July 62,
by R. M. Gagne, J. E. Krantz and others.
31 July 62, 21p. incl. illus. table.
(Contract DA 36-039-sc-86721)

Unclassified report

DESCRIPTORS: *Transistors, *Manufacturing methods, Reliability, Gold, Electrodeposition, Production, Processing, Life expectancy, Tests.

A method for plating the gold ring on the emitter side of the transistor was developed. The optimum thickness and width of the ring, and the optimum distance between it and the emitter were also determined. The maximum flatness obtainable in the emitter pit was determined. A cathodic etching method was investigated and has proved extremely well suited for etching the collector pit. The optimum emitter and collector diameters were found. The emitter and collector lead attaching process was studied and has proved satisfactory for this application. The status of the program, life test results, and a schedule of life testing to be performed are presented. (Author)

AD-286 571 Div. 8, 15
(TISTP/TL) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
TAKING INTO ACCOUNT THE INFLUENCE OF THE COHERENTLY REFLECTED PORTION OF A SIGNAL UPON ITS CORRELATION CHARACTERISTICS,
by V. A. Chena. 4 Sep 62, 11p. incl. illus. 8 refs. (Trans. no. FTD-TT-62-1029 from Izvestiya Vysshikh Uchebnykh Zavedeniy, Fizika 4: pp. 17-22, 1961)

Unclassified report

DESCRIPTORS: *Statistical functions, *Communications theory, *Ionosphere, *Radio signals, Diffraction, Scattering, Reflection, Radio receivers.

A correlation function is obtained for the squared envelope of a signal reflected from the ionosphere, which takes into account the coherently reflected and the scattered signal simultaneously. The relation of the correlation functions to the input and output of a receiver of signals reflected from the atmosphere with different values of the turbidity function is analyzed. It is shown that the value of the negative oscillations of the correlation function of the squared envelope for a rough screen with drift depends upon the value of the turbidity function. The results obtained throw light upon previous papers and can be of use in an analysis of the relationship between the experimentally obtained correlation functions and the structure of the reflecting region of the ionosphere. (Author)

AD-286 603 Div. 8
(TISTP/FR) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE RATE OF INFORMATION TRANSMISSION THROUGH SYMMETRIC CHANNELS,
by L. F. Borodin. 10 Sep 62, 27p. incl. illus. 9 refs. (Trans. no. FTD-TT-62-878 from Sto Let so Dnya Rozhdeniya A. S. Popova, Yubileynaya Sessiya, Izdatel'stvo Akademif Nauk SSSR, pp. 57-73, 1960)

Unclassified report

DESCRIPTORS: *Information theory, Coding.

Expressions are given for the traffic capacity of symmetric channels. A graphical method is given for determining the optimum value of the probability of symbol erasure (in the sense of the maximum traffic capacity of a channel). The problem of the rate of information transmission through a symmetric a channel is examined. It is shown that the optimum code of an erase channel in the presence of a sufficiently large number of symbols in a code combination allows information to be transmitted through an erase channel with a previously assigned uncertainty and rate, close to the traffic capacity of the channel. A method is indicated for setting up codes which have properties close to those of the optimum code of an erase channel, and also codes in which all combinations differ from one another exactly by d = a to the m-1 positions. (Author)

AD-286 615 Div. 8
(TISTP/FR) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
METHOD OF CYCLICALLY DEFLATING AN ELECTRON BEAN,
by G. E. Levin. 20 Aug 62, 3p. incl. illus. (Trans. no. FTD-TT-62-1104 from Patent no. 140122 (684959.26) pp. 1-2, 1960)
Unclassified report

DESCRIPTORS: *Electron beams, Electric fields, Magnetic fields.

A method is given for cyclically deflecting an electron beam for the purpose of increasing the sensitivity toward deflection of an electron-ray instrument. The electron beam is passed repeatedly through one deflecting field (electric, magnetic or combined) with the aid of an auxiliary magnetic field. (Author)

AD-286 641 Div. 8
(TISTE/CRJ) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D.C.
INVESTIGATIONS ON A BEAM WAVEGUIDE FOR OPTICAL FREQUENCIES.
by G. Goubau and J. R. Christian. 1962, 11p. incl. illus. 5 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, N. Y.

DESCRIPTORS: *Waveguides, *Lasers, *Light communication systems, Optical equipment, Light, Light pulses, Waveguide irises, Dielectrics, Electromagnetic lenses, Measurement, Microwaves, Light transmission.

The beam waveguide is a transmission device for the millimeter and submillimeter frequency range. It utilizes reiterative wavebeams which are guided by resetting the cross-sectional phase distribution of the beam at periodic intervals. In order to explore the applicability of the beam waveguide to the transmission of coherent light over long distances a beam waveguide of 970m length was constructed for the optical frequency range. The phase transformation is performed at intervals of 97m by plane-convex glass lenses of 2cm diameter and a focal length of 48.5m. The lenses are covered with a reflection reducing coat for the wavelength range around 5500A. The diameters of the lenses are about 25% greater than necessary from the viewpoint of diffraction losses to reduce the effect of misalignment of the lenses on the transmission loss. The energy in the light beam is essentially confined to a cylindrical space of about 5mm in diameter. The light beam is enclosed within an aluminum pipe of 6 inches in diameter. Alignment of the lenses is achieved by remote control. The entire structure is supported by wooden poles several feet above ground level. (Author)

AD-286 684 Div. 8, 15
(TISTP/WH) OTS price $6.60

Stanford Research Inst., Menlo Park, Calif.
COUPLED MODE THEORY FOR ADVANCED MICROWAVE DEVICES.
Interim rept. no. 2,
by M. C. Pease and C. W. Barnes. Oct 62, 57p. incl. illus. 7 refs.
(Contract AF 33(657)8343, Proj. 4156)
Unclassified report

DESCRIPTORS: *Microwave networks, *Topology, *Microwaves, *Propagation, *Vector analysis, *Parametric amplifiers, Matrix algebra.

A generalized theory of coupled modes of propagation is applied to the study of interactions in distributed microwave devices. In Section II-A a technique is discussed which is suitable for the analysis of non-uniformly coupled systems characterized by the coupled mode matrix equation $dx/dz = -iR(z)x$ where $dR/Dz = (A,R)$ and A is a constant matrix. In Section II-B the theory of pairwise coupling is extended to include the possibility of cross-conjugate modes. An alternative view of this situation interprets it as certain rather special types of multiplet coupling. In Section II-C, theorems are proved that were inferred in Section II-B. The proof is probably of mostly academic interest, but it does give some insight into the nature of the problem. In particular, the proof demonstrates the possibility of removing some of the limitations imposed in Section II-B, which were introduced because of the particular application being considered there. (Author)

AD-286 693 Div. 8, 26
(TISTE/JBM) OTS price $2.60

Atomics International, Canoga Park, Calif.
UNIFORM WORK FUNCTION CATHODE STUDIES FOR THERMIONIC CONVERTERS.
Quarterly rept. no. 1, 12 July-12 Oct 62,
by M. N. Huberman. Oct 62, 25p. incl. illus. 4 refs.
(Contract AF 33(657)8726)
Unclassified report

DESCRIPTORS: *Thermionic emission, *Cathodes, *Generators, *Electric power production, Cesium, Diodes, Temperature, Tests, Measurement, Work functions, Manufacturing methods, Test equipment, Standardization, Materials, Molybdenum, Sodium compounds, Hydroxides, Electrodes, Vapor plating, Crystals, Growth, Pyrolysis, Molybdenum compounds, Fluorides, Chlorides, Carbides, Casting, Chemical milling, Potassium compounds, Processing.

Uniform work functions of thermionic converters were investigated. The performance of cylindrical converters which have emitters with uniform work function surface was evaluated. Chemical vapor deposition techniques were developed for the fabrication of nonplanar emitters of practical design which have improved uniformity of work function over the uniformity of work function of standard polycrystalline emitters. The development of thermionic converters having emitters of improved uniformity of work function may result in increased efficiency and power density. A converter test stand was assembled, equipment associated with the test stand was calibrated, and deposition samples were fabricated. (Author)

AD-286 711 Div. 8, 7
(TISTE/CAM) OTS price $3.60

General Electric Co., Schenectady, N. Y.
EVALUATION OF A MOLYBDENUM EMITTER, LOW VOLTAGE ARC THERMIONIC POWER CONVERTER.
Quarterly technical progress rept. no. 2,
15 June-15 Sep 62,
by E. A. Baum. Oct 62, 24p. incl. illus. (Rept. no. R-606 Q-2)
(Contract AF 33(657)8323)
Unclassified report

DESCRIPTORS: *Thermoelectricity, *Cesium electron tubes, *Cathodes (Electron tubes), *Electric power production, Design, Molybdenum, Test equipment, Test methods, Life expectancy, Electric discharge, Electric arcs, Transients, Voltage, Thermionic emission.

Research and development was continued to conduct an evaluation of a molybdenum emitter, low voltage arc thermionic converter. The objective was to define and minimize the life limiting and degradation factors affecting the usefulness of the low-temperature cesium vapor converter. Work on the program was directed toward a life test evaluation of a state-of-the-art, planar cesium vapor thermionic converter. Research was continued to arrive at a technical specification for a state-of-the-art vapor converter utilizing a molybdenum cathode. Effort was directed toward the design and fabrication of life test equipment suitable for obtaining meaningful data on the state-of-the-art cesium vapor thermionic converter as well as the fabrication of devices for test, and toward completion of the life test equipment, initiation of life tests, and the acquisition of operational data. (Author)

AD-286 717 Div. 8, 25, 26
(TISTM/EJH) OTS price $2.60

Knights, James, Co., Sandwich, Ill.
PRECISION GLASS CRYSTAL UNITS.
Quarterly rept. no. 4, 1 Apr-30 June 62,
by Louis A. Dick and R. E. Bennett. 30 June 62, 23p. incl. illus. tables.
(Contract DA 36-039-sc-87268, Proj. 3G-26-05-001)
Unclassified report

DESCRIPTORS: *Quartz crystals, *Crystal oscillators, Glass, Crystals, Vacuum systems, Manufacturing methods, Crystal holders.

Satisfactory operation of the fluidless, (Ultek) vacuum system, changes in cementing procedure, and submission of sample units are reported. The current fabrication process is detailed, and portions of it are discussed. Some of the cement experiments are reported. Measurements of completed 2 and 3 mc units are given together with the manufacturing specification applicable to these units. (Author)

AD-286 727 Div. 8
(TISTE/CAM) OTS price $5.60

Radiation, Inc., Melbourne, Fla.
MULTIBAND TELEMETRY RECEIVER.
Quarterly rept. no. 1, 13 July-23 Oct 62,
by R. V. Murray. Oct 62, 46p. incl. illus.
(Contract N600(19)50925, Proj. 1653-01-4360)
Unclassified report

DESCRIPTORS: *Telemetering receivers, *Telemeter systems, *Communication equipment, Solid state physics, Crystal mixers, Crystal oscillators, Radiofrequency oscillators, Shipborne, Airborne, Design, Electrical properties, Mechanical properties, Packaged circuits, Detectors, Plugs (Electricity), Band-pass filters, Video filters, Radiofrequency amplifiers, Transistors, Crystal limiters, Video amplifiers, Frequency multipliers, Frequency stabilizers, Electronic integrators, Power supplies, Very high frequency, Ultra high frequency, Superhigh frequency.

The technical status, design approach, design and test data on developed breadboard circuits were described in detail. Detailed descriptions of the individual circuit functions, including design and test results are included. Block diagrams and simplified schematics are included to aid in the discussion of the individual circuits. A discussion on the packaging concept is included with a photograph of a mechanical mock-up. The design approach to the over-all equipment package and subassemblies is presented with details of individual subassembly problems and design criteria. (Author)

AD-286 756 Div. 8, 15
(TISTP/WH) OTS price $3.60

RAND Corp., Santa Monica, Calif.
IMPROVED ASYMPTOTIC PROPERTIES OF ERROR CORRECTING CODES,
by Selmer M. Johnson. Sep 62, 31p., 4 refs.
(Research memo. RM-3232-PR)
(Contract AF49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Communications theory, *Coding, *Combinatorial analysis, *Errors, *Groups (Mathematics).

A new upper bound on nonsystematic binary error-correcting codes, using a sphere-packing approach and combinatorial analysis is discussed. A significant refinement is now added; together with a detailed study of the asymptotic behavior of the upper bound, this enables one to show that any large code must correct almost all sequences with a larger number of errors than the code was designed for. This excess is expressed numerically as a fraction of the designed error-correcting capability of the code. The fraction is a function of the ratio of the sequence length and the designed error-correcting capability. A possible application might be in the use of a larger code giving almost certain error correction rather than a smaller one with certain correction capability. (Author)

AD-286 771 Div. 8, 30
(TISTE/JBM) OTS price $1.60

Airborne Instruments Lab., Inc., Deer Park, Long Island, N. Y.
NEW METHODS FOR MEASURING SPURIOUS EMISSIONS.
Quarterly progress rept. no. 5,
by O. Hinckelmann, D. Levinson and others.
Sep 62, 8p. illus. 2 refs. (Rept. no. 1112-I-5)
(Contract AF 30(602)2511, Proj. 1112)
(RADC TDR 62-477)
Unclassified report

DESCRIPTORS: *Radiofrequency power, *Radar transmitters, *Radio transmitters, *Microwave probes, Microwaves, Waveguides, Tests, Amplifiers, Test equipment, Electronic commutators, Generators, Magnetic actuators, Trigger circuits, Electronic circuits, Instrumentation, Voltage, Test methods, Measurement.

Development of methods for measuring the power of spurious emissions from microwave transmitters using the fixed-probe multimode measurement method was continued. A voltage-squaring circuit, which was incorporated in the instrumentation for the fixed-probe multimode power measuring equipment is described. The control panel and probe sampling unit were completed. Results of tests and progress in the packaging of the equipment are given. In a test of the over-all instrumentation, the error in the automatic average of the probe-coupled power was 0.6 db. (Author)

AD-286 774 Div. 8
(TISTP/MS) OTS price $8.10

Electronic Communications, Inc., Timonium, Md.
PSEUDO RANDOM ARRAY INVESTIGATION,
by J. W. Sherman, M. I. Skolnik and others.
13 Aug 62, 76p. incl. illus. tables, 11 refs.
(Technical note no. 2)
(Contract AF 30(602)2626, Proj. 4506)
(RADC TDR 62-414) Unclassified report

DESCRIPTORS: *Antennas, *Antenna radiation patterns, Lobing, Mathematical analysis, Least squares method, Design, Measurement.

An investigation concerning pseudo random arrays is described. Particular emphasis was placed on applying new areas of mathematics to the array problem. For example, dynamic programming and number theory were explored and related to linear array theory. Techniques for thinning planar arrays by random removal of elements from equally spaced arrays are discussed, and the ring array investigation was continued with calculations of several patterns. Other criteria for obtaining good patterns were investigated. (Author)

AD-286 775 Div. 8
(TISTE/CRJ) OTS price $1.60

General Electric Co., Schenectady, N. Y.
INVESTIGATION OF VARIOUS ACTIVATOR REFRACTORY SUBSTRATE COMBINATIONS,
by J. H. Affleck. 27 Sep 62, 7p. incl. illus. 17 refs. (Scientific rept. no. 3)
(Contract AF 19(628)279, Proj. 4619)
(AFCRL 62-755) Unclassified report

DESCRIPTORS: *Cathodes (Electron tubes), Life expectancy, Thermionic emission, Pressure, Analysis, Ions, Spectrographic analysis, Refractory materials.

Cathode life tests continued beyond 8000 hours and new techniques for displaying the retarding potential characteristic are being studied. A partial pressure analyzer was added to the vacuum system for studying the gases evolved from dispenser cathodes and the poisoning effect of various gases. Preliminary results and observations are discussed. (Author)

AD-286 783 Div. 8
(TISTE/CAM) OTS price $13.00

HRB-Singer, Inc., State College, Pa.
FEASIBILITY STUDY OF A HIGH PERFORMANCE ANTENNA TEST RANGE,
by A. J. Campanella, C. F. Douds, and R. E. Wolfe. 19 Oct 62, 177p. incl. illus. refs.
(Rept. no. 289.4-F)
(Contract AF 30(602)2445)
(RADC TDR 62-301) Unclassified report

DESCRIPTORS: *Antennas, *Test facilities, *Parabolic antennas, Feasibility studies, Design, Antenna radiation patterns, Measurement, Scattering, Terrain, Errors, Radio receivers, Radio transmitters, Antenna masts, Remote control systems, Meteorology, Atmospheric refraction, Refractive index, Signal-to-noise ratio, Radio signals, Propagation, Electromagnetic wave reflection, Very high frequency, Ultra high frequency, Superhigh frequency, Extremely high frequency.

The problems in the design of a range are to provide adequate spacing for far field measurements and to provide sufficiently uniform illumination of the antenna under test. Analytical treatment was given to the Fraunhofer equation for antenna spacing, the deliberate use of the range surface reflection, and the use of a ramped surface and fences to avoid undesired scattering above L-band. Receiver gating and FM techniques were analyzed for eliminating scattering from beyond the range. A 600-ft range with a movable transmitter unit and adjustable height transmitter antenna was recommended. (Author)

AD-286 788 Div. 8, 25
(TISTP/JW) OTS price $15.00

Electron Physics Lab., U. of Michigan, Ann Arbor.
APPLIED RESEARCH IN MICROWAVE AND QUANTUM ELECTRONICS.
Interim scientific rept. no. 1, 5 Feb-5 Aug 62,
by J. E. Boers, H. K. Detweiler and others.
Aug 62, 204p. incl. illus. table (Rept. no. 05000-1-S)
(Contract AF 33(657)8050, Proj. 4856)
Unclassified report

DESCRIPTORS: *Quantum mechanics, *Microwaves, Thermal conductivity, Electron beams, Gases, Masers, Plasma physics, Ionization, Electric fields.

Several techniques for mounting a wire helix in a beryllium oxide envelope with good thermal contact between the two materials are described, including a solution of the heat equation for the helix-envelope system. The theoretical analysis of noise transport in a two-dimensional electron beam diode is carried out using two methods, the Monte Carlo method and the density function method. Extensive results of the former are presented while for the latter only the derivation of the working equations is shown. For the noise propagation in a multivelocity electron beam an analogy has been made to acoustic waves in air. An electron gas being a nondispersive medium is considered under equilibrium conditions. The maser work includes work on materials and slow-wave structures for broadband traveling-wave masers. A number of pumping schemes are presented. Nonlinear beam-plasma interaction equations have been derived. These equations are in a stage where they can be programmed for solution on a digital computer. A small-signal theoretical treatment of a beam of charged particles interacting with a weakly ionized stationary plasma is also given. Poisson cell work in conjunction with an analog computer is discussed. A multi-electrode crossed-field gun has also been constructed. (Author)

AD-286 791 Div. 8, 25
(TISTE/CAM) OTS price $6.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
TECHNICAL NOTE ON PULSE GENERATION,
by Enrico Levi. 21 May 62, 40p. illus. tables, 14 refs. (Rept. no. PIBMRI-1007-62)
(Contract AF 30(602)2149)
(RADC TDR 62-290) Unclassified report

DESCRIPTORS: *Pulse generators, *Electromechanical converters, Electromagnetic fields, Conductors, Radiofrequency coils, Thermal stresses, Mechanical properties, Mathematical analysis, Plasma physics, Magnetic fields, Direct current, Temperature, Pressure, Cooling, Design.

The results of investigations on generation shaping and control of high-power electric pulses are summarized. The following topics are included: (1) design of iron and air cored electromechanical pulsers. Strong interaction between electromagnetic fields and moving conducting media; (2) magnetic flux pump, a device for generation of high intensity magnetic fields; and design of air-cored water-cooled magnets. (Author)

AD-286 798 Div. 8
(TISTE/CAM) OTS price $9.10

Shockley Transistor Corp., Mountain View, Calif.
RESEARCH STUDY OF HIGH-POWER HIGH-FREQUENCY SOLID STATE OSCILLATORS.
Final rept., 1 July 61-30 June 62,
by R. M. Scarlett. 30 June 62, 104p. incl. illus.
(Contract DA 36-039-sc-87324, Proj. 3A99-21-001)
Unclassified report

DESCRIPTORS: *Radiofrequency oscillators, *Oscillator circuits, *Semiconductors, *Solid state physics, Switching circuits, Trigger circuits, Diodes, Pulse generators, Voltage, Packaging, Capacitors, Manufacturing methods, Negative resistance circuits, Transistors, Electric currents, Space charges, Temperature, Radiofrequency power, Silicon, Tests.

Effort was continued to investigate novel silicon devices and their application in high-frequency, high power oscillators. Information is presented on sequential oscillators employing four layer diodes or four layer three-terminal devices. The general theory of such oscillators is presented, and the results on three experimental models are reported. The three-terminal devices achieved a pulse power of 3 kw at 3 mc. On the development of four layer diodes for and circuit experiments with a push-pull oscillator circuit, symmetrical gold doped diodes produced a power output of 2 watts at 5 mc, in agreement with theory. Discussed are three layer avalanche negative resistance diodes for continuous oscillators, and a four layer three-terminal device with interdigitated emitter-base structure. A complete processing schedule is given and circuit performance reported. A single device can produce 100 kw peak pulse power and appears useful in sequential oscillator circuits, or in driving harmonic generators. A theoretical analysis is given of the pulsed-power output of transistors at high frequencies. (Author)

AD-286 862 Div. 8, 25
(TISTE/CAM) OTS price $2.75

Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
DYNAMIC RESPONSE AND TEST CORRELATION OF ELECTRONIC EQUIPMENT.
Final rept., July 61-Apr 62 on Environmental Simulation Investigations for Flight Vehicle Subsystems and Support Equipment,
by Denis U. Noiseux, James J. Coles and others.
Aug 62, 123p. incl. illus.
(Contract AF 33(616)7743, Proj. 1309)
(ASD TDR 62-614) Unclassified report

DESCRIPTORS: *Electronic equipment, Acoustics, Vibration, Guided missiles, Aircraft, Simulation, Measurement, Packaging, Electronic circuits, Microminiaturization (Electronics), Mathematical analysis, Theory, Sound.

A new theory for estimating the response of a complex structure is reviewed. This theory is based on a modal energy balance between the excitation and the structure. The theory is general enough to apply to vibration excitation as well as to acoustic excitation. The theory is applied to a simple structure, a box, simulating an electronic package excited by a reverberant acoustic field, and is verified for this case by experiments. Some refinements of the experimental technique are indicated. A formulation of the equivalence between vibration testing and acoustic testing is offered. The importance of developing such a formulation is demonstrated by showing the economy resulting from its application. Criteria are presented for specifying acoustic tests. The dimensions and power requirements of reverberant room test facilities are derived. Experimental results justify the derivations. Results of vibration tests of a microelectronic circuit and a field effect transistor are given. (Author)

AD-286 872 Div. 8, 26
(TISTE/JBM) OTS price $6.60

Delco Radio Div., General Motors Corp., Kokomo, Ind.
PRODUCTION ENGINEERING MEASURE TO IMPROVE PRODUCTION TECHNIQUES AND INCREASE THE RELIABILITY OF THE 2N1358A TRANSISTOR.
Quarterly progress rept. no. 1, 30 Apr-30 July 62,
by J. C. Kuhns. 30 July 62, 65p. incl. illus. table.
(Contract DA 36-039-sc-86725)
Unclassified report

DESCRIPTORS: *Transistors, *Manufacturing methods, Semiconductors, Processing, Reliability, Materials, Germanium, Growth, Crystals, Indium alloys, Test equipment, Life expectancy, Test methods, Temperature, Thermal stresses, Electric currents, Chemical milling, Production.

Efforts were made to improve the reliability of 2N1358A transistors by improvement of manufacturing techniques including equipment and process modifications, reliability tests, failure analysis and analytical-empirical surface studies. The wafer flash-etch was incorporated in the alloy area to minimize the time between etch and alloy. All of the germanium wafers for 2N1358 type transistors are currently being sliced by the internal sawing method. The major reliability problems are degradation of the collector diode due to surface contamination; emitter diode degradation due to surface defects; and high floating potential due to fracturing of spur regrowth at the collector periphery. The residual gas analysis has indicated on all units tested the presence of water vapor (possibly adsorbed) beyond what was expected in view of the baking and dry air capping procedure in production. This, in conjunction with indications of adsorbed gas in nickel plated parts, and the results of bake-out recovery techniques on degraded collector diodes, provides clues and suggests experiments to determine corrective action for the collector diode degradation problem. (Author)

AD-286 886 Div. 8, 26
(TISTE/JBM) OTS price $3.60

General Electric Co., Schenectady, N. Y.
SILICON PLANAR EPITAXIAL TRANSISTOR TYPE 2N2193.
Quarterly rept. no. 1, 30 Apr-31 July 62 on Production Engineering Measure,
by S. O. Johnson. 31 July 62, 33p. incl. illus. tables, 2 refs.
(Contract DA 36-039-sc-86727)
Unclassified report

DESCRIPTORS: *Transistors, Silicon, Manufacturing methods, Processing, Alloys, Evaporation, Heating, Infrared lamps, Temperature, Vacuum apparatus, Aluminum alloys, Chemical milling, Boron compounds, Vibration, Life expectancy, Gases, Hydrogen, Nitrogen, Diffusion, Materials, Phosphorus, Electrodes, Thermal stresses, Reliability, Tests, Failure (Mechanics), Humidity, Voltage, Semiconductors, Production.

Contents:
Improved KPR resolution
Contact evaporation and alloying
Collector etching
Boron diffusion
Phosphorus diffusion
Collector contact to the header
Interconnections
Reliability measurement
Failure analysis

9. FLUID MECHANICS

AD-285 619 Div. 9
(TISTA/SEB) OTS price $10.10

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
HIGH ALTITUDE SHOCK WAVE STRUCTURE. PART I. SHOCK WAVE STRUCTURE WITH ROTATIONAL AND VIBRATIONAL RELAXATION. PART II. A SHOCK TUBE STUDY OF THE THERMAL DISSOCIATION OF NITROGEN,
by S. M. Scala, L. Talbot and B. B. Cary.
Oct 62, 130p. incl. illus. tables, refs.
(TIS rept. no. R62SD32)
(Contract AF 49(638)931)
(AFOSR-1494) Unclassified report

DESCRIPTORS: *Shock waves, *Shock tubes, Analysis, Hypersonics, Velocity, Temperature, Pressure, Theory, Mathematical analysis, Equations, Gases, Dissociation, Nitrogen, Rotation, Vibration, Vortices, Kinetic theory, Reaction kinetics, Energy, Dynamics, Relaxation time, Viscosity, Computers, Programming, Tests, Re-entry aerodynamics, High altitude.

A theoretical model is developed for the structure of a shock wave in a diatomic gas including rotational and vibrational relaxation phenomena. Experiments are carried out in a combustion driven shock tube. Experimental data for vibrational relaxation times and dissociation rates are obtained for nitrogen. Estimates are provided for the distribution of translational temperature through a normal shock wave obtained with the neglect of relaxation phenomena. Realistic values of the thickness of the shock transition also were obtained. Coupling between the internal degrees of freedom was investigated. Combustion generated shock is used for shock structure studies. The relative efficiency of nitrogen atoms and molecules was determined. Temperatures to 6000 K in pure nitrogen, the data indicate that vibrational relaxation and dissociation may be treated in an uncoupled manner. The data were compared with the data obtained by earlier investigators. (Author)

AD-285 632 Div. 9
(TISTP/MS) OTS price $7.60

Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park.
AN EXPERIMENTAL STUDY OF THE THREE DIMENSIONALITY OF THE FLOW AROUND A CIRCULAR CYLINDER,
by George E. Mattingly. June 62, 67p. incl. illus. 13 refs. (Technical note no. BN-295)
(Contract AF 49(638)645)
Unclassified report

DESCRIPTORS: *Laminar boundary layer, *Fluid flow, *Velocity, Motion, Reynolds number, Theory, Cylindrical bodies.

AD-285 862 Div. 9, 13, 31
(TISTE/CRJ) OTS price $6.60

Ordnance Research Lab., Pennsylvania State U., University Park.
SHELLS FOR UNDERWATER VEHICLES,
by J. D. Stachiw. 28 Sep 62, 56p. incl. illus. refs. (Serial no. NOrd-16597-89)
(Contract NOrd-16597)
Unclassified report

DESCRIPTORS: *Structural shells, *Hydrodynamics, Sandwich construction, Honeycomb cores, Materials, Pressure, Stiffened cylinders, Hydrostatic pressure, Pressure vessels, Stresses, Reliability, Failure (Mechanics), Elasticity, Theory, Submarine hulls, Corrosion inhibition, Plastics, Glass textiles, Titanium, Aluminum, Steel, Magnesium, Ceramic materials, Underwater.

The design criteria for underwater shells are discussed, and the basic shell designs are evaluated on the basis of these criteria. Internally pressurized shells and shell-pressurization methods are also discussed. At present, the sandwich-shell design offers the highest pressure-to-weight ratio consistent with the shell-design criteria. The honeycomb or microballoon fiber glass sandwich shells could be best used in the lower pressure ranges and cellular sandwich shells, for a large band of intermediate pressure ranges; the cellular or solid sandwich shells would be better used at the high pressure ranges. It is recommended that research be directed toward development of higher-strength materials and improved fabrication methods. It is also recommended that fluids of lower compressibility and density be developed for shell pressurization. (Author)

AD-285 864 Div. 9, 1
(TISTA/GEC) OTS price $9.60

Princeton U., N. J.
AN EXPERIMENTAL AND ANALYTICAL STUDY OF THE MECHANICAL INSTABILITY ROTORS ON MULTIPLE-DEGREE-OF-FREEDOM SUPPORTS,
by Richard L. Lielawa. June 62, 89p. illus. tables, 8 refs. (Rept. no. 612)
(Contract DA 44-177-tc-524, Proj. 9-38-01-000)
Unclassified report

DESCRIPTORS: *Helicopter rotors, *Helicopters, Vibration, Stability, Theory, Tests, Mathematical analysis, Vertical take-off planes, Ground effect.

An experimental and analytical study is made of the helicopter ground instability phenomenon. The results of an experimental program, established for the purpose of verifying the Brooks theory for the mechanical instability of rotors, are presented. A dynamic model of a flexibly mounted rotor was constructed and tested for this purpose. The analytical studies involve extensions of the theory. Solutions to the previously unsolved portions of the theory are presented. The results show excellent experimental verification of the theory. All cases of practical interest are covered by the two-and three-bladed cases which are treated. A simplifying generalization of the ground instability phenomenon is presented. (Author)

AD-286 028 Div. 9, 12
(TISTA/VGW) OTS price $2.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
ON THE STABILITY OF AXISYMMETRICAL FLOWS,
by S. I. Pai. July 62, 28p. 5 refs. (Rept. no. R62SD75)
(Contract AF 04(647)269)
Unclassified report

DESCRIPTORS: *Axially symmetric flow, *Re-entry aerodynamics, Re-entry vehicles, Bodies of revolution, Hypersonic flow, Laminar boundary layer, Wake, Jets, Perturbation theory, Differential equations, Velocity, Mathematical analysis, Torque, Stability, Fluid flow.

The stability equation of an axisymmetrical flow of an incompressible fluid subjected to rotationally-symmetric disturbances is derived and studied. It is shown that the axisymmetri-

cal flow is always stable with respect to disturbances of the tangential velocity component. Hence, the stability equation for axisymmetrical disturbance is then investigated in detail for arbitrary basic velocity profiles. It was found that the stability of an axisymmetrical flow may be reduced approximately to the corresponding problem of two-dimensional flow by proper transformations. The comparison of stability of an axisymmetrical flow with that of a corresponding two-dimensional flow is discussed according to an equivalent principle. It is found that the minimum critical Reynolds number of an axisymmetrical wake, or jet, is of the same order of magnitude as that of a two-dimensional boundary layer flow which is much higher than the value for a two-dimensional wake, or jet. (Author)

AD-286 104 Div. 9, 27
(TISTP/WH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
SELECTION OF THE PERIPHERAL VELOCITY OF THE WHEEL OF THE CENTRIFUGAL STAGE OF A COMPRESSOR,
by K. F. Shpital'nikov. 11 June 62, 16p. incl. illus. 10 refs. (Trans. no. FTD-TT-62-713 from Teploenergetika, No. 6, pp. 42-47, 1961)
Unclassified report

DESCRIPTORS: *Centrifugal compressors, *Gas flow, Design, USSR.

AD-286 122 Div. 9
(TISTP/TL) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A NONSTEADY-STATE BOUNDARY-VALUE PROBLEM OF THE HYDRODYNAMICS OF A VISCOUS INCOMPRESSIBLE FLUID,
by O. V. Guseva. 8 June 62, 19p. 7 refs. (Trans. no. FTD-TT-62-710 from Vestnik Leningradskogo Universiteta, Seriya Matematiki Mekhaniki i Astronomii, No. 4, pp. 122-137, 1961)
Unclassified report

DESCRIPTORS: *Hydrodynamics, *Fluid flow, Motion, Potential theory, Green's function, Tensor analysis, Linear systems, Equations, Functional analysis, Integral equations, Vector analysis, Polynomials.

AD-286 129 Div. 9
(TISTP/WH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INVERSE BOUNDARY-VALUE PROBLEMS AND PRACTICAL METHODS FOR THEIR SOLUTION,
by G. G. Tumashev. 5 June 62, 9p. incl. illus. 3 refs. (Trans. no. FTD-TT-62-675 from Izvestiya Vysshikh Uchebnykh Zavedeniy, Energetika, No. 2, pp. 103-108)
Unclassified report

DESCRIPTORS: *Fluid mechanics, *Airfoils, *Gas flow, *Boundary layer, *Aerodynamics, Integral equations, USSR.

AD-286 180 Div. 9, 25
(TISTP/TL) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ENGINEERING PHYSICS JOURNAL (SELECTED ARTICLES).
23 July 62, 18p. refs. (Trans. no. FTD-TT-62-680 from Inzhenerno-Fizicheskiy Zhurnal 4:10. pp. 52-63, 127-128, 1961)
Unclassified report

DESCRIPTORS: *Fluid flow, *Pipes, *Heat transfer, *Solids.

AD-286 181 Div. 9
(TISTP/WH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AN ANALYTICAL STUDY OF THE SEPARATED LAMINAR FLOW OF A TWO-PHASE MIXTURE IN INCLINED PIPES,
by N. I. Semenov and A. A. Tochigin. 8 June 62, 10p. incl. illus. 2 refs. (Trans. no. FTD-TT-62-717 from Inzhenerno-Fizicheskiy Zhurnal 4:11, pp. 29-36, 1961)
Unclassified report

DESCRIPTORS: *Fluid flow, *Hydrodynamics, *Laminar boundary layer, Pipes, Liquids, USSR.

An accurate solution is given of the equations of the hydrodynamics of the separated laminar flow of a two-phase mixture in inclined and horizontal pipes. On the basis of this solution, relationships are obtained between the hydraulic values and the characteristic criteria. (Author)

AD-286 189 Div. 9, 25
(TISTP/TL) OTS price $1.10

Foreign Tech., Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
EXPERIMENTAL INVESTIGATION OF HEAT TRANSFER OF A LONGITUDINALLY STREAMLINED PLATE IN A LAMINAR BOUNDARY LAYER.
by A. A. Zhukaukas and I. I. Zhyugzhda.
22 June 62, 8p. incl. illus. 10 refs. (Trans. no. FTD-TT-62-798 from Inzhenerno-Fizicheskiy Zhurnal 4:11, pp. 105-108, 1961)
Unclassified report

DESCRIPTORS: *Heat transfer, *Sheets, *Laminar boundary layer, *Fluid flow, Temperature, Air, Water, Nickel alloys, Silicon alloys, Measurements, Thermocouples, Tests.

The present investigation was carried out on two identical circuits of a closed type. Water and air were circulated in one of them and transformer oil in the other. The diagram of the circuit is given. Two plates were investigated with dimensions of 10.25 x 40 x 0.65 and 50.25 x 40 x 0.65 mm, which were installed in the experimental section of the circuit in rectangular channel with dimensions of 200 x 100 mm. The side walls of the experimental section were made of organic glass which made it possible to see the flow process. Laminar flow of the plates was established during all experiments. Both plates were made of silico-nickel, 0.1 mm thick. The leading edges of the plates had the shape of a semicircle with a radius of about 0.33 mm. Copper thermocouples 0.15 mm in diameter were placed between the lower and upper walls of the plate. The thermocouple junctions were isolated from the plate surface by a thin layer of mica (0.03 mm) attached by BF-2 glue. (Author)

AD-286 256 Div. 9
(TISTP/MS) OTS price $.75

Diamond Ordnance Fuze Labs., Washington, D. C.
FLUID AMPLIFICATION. I. BASIC PRINCIPLES,
by R. W. Warren and S. J. Peperone. 15 Aug 62, 35p. incl. illus. (Rept. no. TR-1039)
(DOFL Proj. 31100)
Unclassified report

DESCRIPTORS: *Fluid mechanics, *Fluid flow, Pressure, Pneumatic systems, Hydraulic systems, Control systems, Design, Amplifiers.

Studies made on pure fluid amplification resulted in an over-all program for design and development of fluid amplifiers, both bistable and proportional, with no moving parts. Both flow and

pressure at the receiving apertures of the proportional-type device depend on the power jet strength and flow direction. Since the flow direction is controlled by a low-energy jet, the ouput from the apertures is an amplified version of the control jet input. The energy controlled in the amplifier is an order of magnitude larger than the controlling energy. If the walls are relatively close to the interaction region, the stream has a marked tendency to attach to one of the walls. This wall-attachment phenomenon causes the fluid stream to shift completely from one output to the other in response to a control jet pulse, thereby permitting bistable operation. For a proportional unit, the walls are positioned much farther out to minimize the wall effect. Specifically covered in this report are the effects of the wall and splitter positions in bistable operation, and an analysis of the gain forportional operation. (Author)

AD-286 316 Div. 9, 1
(TISTA/GEC) OTS price $12.50

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
SUPPLEMENTARY LIFT FOR AIR CUSHIONED VEHICLES. VOLUME II. DATA ANALYSIS,
by N. Kirschbaum and J. Helgesen. June 62, 164p. incl. illus. 4 refs.
(Contract DA 44-177-tc-708)
(TCREC TR 62-50) Unclassified report

DESCRIPTORS: *Flying platforms, Lift, Wind tunnel models, Model tests, Design, Stability, Aerodynamic configuration, Air speed, Jets, Stability (Longitudinal), Roll, Stability (Lateral), Airfoils, Aerodynamics, Ground effect.

The wind tunnel study of supplemental lift for air cushioned vehicles utilized a three-dimensional, half-span reflection-plane, airfoil-shaped GEM model and covered speeds from 0 to 100 mph. The effects of various leading and trailing edge jet configurations on the performance of the model at zero degree angle of attack were evaluated. The data are presented in parametric form as a function of air mass flow coefficient. The results of this study indicated that the propulsive requirements for the lift system decreased with increasing speed or, for constant power the operating height can be increased. The stability characteristics of the cruise configurations at cruise speed (100 mph were also evaluated). The results of these tests indicated that all cruise configurations tested could be made longitudinally stable by locating the moment reference center (cg) at the 37% air cushion base chord. For the Jet Flap configurations, the required nose down trim loads increased with increasing mass flow. With the Tip Jet Only Configuration, there was an adverse rolling moment with roll angle. This was the only configuration tested in roll. (Author)

AD-286 317 Div. 9, 1
(TISTA/GEC) OTS price $8.10

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
SUPPLEMENTARY LIFT FOR AIR CUSHIONED VEHICLES. VOLUME III. PERFORMANCE ANALYSIS,
by N. Kirschbaum and J. Helgesen. June 62, 78p. incl. illus.
(Contract DA 44-177-tc-708)
(TCREC TR 62-51) Unclassified report

DESCRIPTORS: *Flying platforms, Lift, Aerodynamics, Load distribution, Military operations, Effectiveness, Aerodynamic configuration, Air speed, Nozzles, Jets, Wind tunnel models, Aerial reconnaissance, Logistics, Ground effect.

The results of a wind tunnel study of supplementary lift for air cushioned vehicles were applied to vehicles for the army command reconnaissance and logistics missions. Aerodynamic off-loading of air cushioned vehicles results in an increase of power available during cruise which can be utilized to increase cruise height above the hover height or to operate during cruise at lower power settings. With the configurations in these tests, aerodynamics off-loading was most effective at speeds of 60 mph and above, optimum speed increasing with base loading. At 20 lb/sq ft base loading (16.67 lb/sq ft wing loading) approximately 100 mph offered the lowest power required. Variable leading and trailing edge jet nozzles appear to be highly desirable in providing both aerodynamic off-loading for efficient cruise and an optimum hover configuration. (Author)

AD-286 328 Div. 9, 25
(TISTP/WH) OTS price $5.60

St. Anthony Falls Hydraulic Lab., U. of Minn., Minneapolis.
VENTILATED CAVITIES ON SUBMERGED THREE-DIMENSIONAL HYDROFOILS.
Rept. for 30 Nov 60-28 Feb 62,
by F. R. Schiebe and J. M. Wetzel. Dec 61, 58p. incl. illus. table, 14 refs. (Technical paper no. 36, series B)
(Contract Nonr-71004, Proj. NR 062-192)
Unclassified report

DESCRIPTORS: *Cavitation, *Hydrofoils, *Vortices, *Lift, *Drag, Hydrodynamics.

Experimental studies were made to determine the air-entrainment rates of ventilated cavities for hydrofoils of finite span submerged below a free surface. The study was divided naturally into two parts; reentrant-jet cavities and pulsating or trailing-vortex cavities. A correlation parameter was derived to permit determination of the air-entrainment rates for cavities in the reentrant-jet regime assuming that all the air is lost from the cavity through the reentrant jet. As air was also lost through the tip vortices, some dependence was noted with aspect ratio. Air entrainment was a function of velocity for a given cavitation number and ambient pressure. Cavity instability or pulsation was observed at high air-injection rates for thin cavities. Trailing vortices were observed for thick cavities at the higher injection rates. The frequency of the pulsations tended to increase as the foil approached the free surface. Measurements of lift and drag forces indicated little effect of the free surface for submergence ratios of 1 to 3 chords. (Author)

AD-286 393 Div. 9, 15
(TISTP/TL) OTS price $5.60

Mathematical Research Center, U. of Wisconsin, Madison.
THE APPROXIMATE SOLUTION OF MATRIX PROBLEMS,
by Alston S. Householder. 1 June 57, 55p. 26 refs. (MRC Technical summary rept. no. 4)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Matrix algebra, *Equations, Convex sets, Sequences, Functions, Vector analysis, Convex bodies.

AD-286 395 Div. 9
(TISTP/TL) OTS price $1.60

Mathematical Research Center, U. of Wisconsin, Madison.
PROPAGATION OF CURVED SHOCKS IN PSEUDO-STATIONARY

Division 9 - FLUID MECHANICS

THREE-DIMENSIONAL GAS FLOWS,
by Ram P. Kanwal. 5 July 57, 13p. 5 refs.
(MRC Technical summary rept. no. 6)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Gas flow, *Shock waves, *Cylindrical bodies, *Conical bodies, *Aerodynamics, *Differential equations, *Operators (Mathematics), Surfaces, Entropy, Velocity, Density, Vector analysis, Vortices, Partial differential equations, Matrix algebra, Geometry.

In a previous paper, the curved shocks in 3-dimensional steady gas flows were discussed. Formulas were derived which make possible the determination of the derivatives of velocity, density, pressure and entropy behind the shock surface when the flow in front is known. Furthermore the explicit determination of the vorticity components behind the shock was made, which led to the formulation of a general theorem regarding the characterization of surfaces behind which the flow will remain irrotational. It was found that a plane, a right circular cone, a cylinder and a developable helicoid are the only such surfaces. The main purpose of this paper is to discuss the same problem in the case of unsteady flows. In the case of plane unsteady flows Taub has solved the corresponding problem by introducing a dimensional argument which indicates that, when viscosity and heat conductivity are neglected, there is no intrinsic length in the problem and the problem may be stated in terms of the independent variables alone. (Author)

AD-286 396 Div. 9, 15
(TISTP/WH) OTS price $1.10

Mathematical Research Center, U. of Wisconsin, Madison.
A REMARK ON ''A GENERAL SOLUTION OF THE EQUATIONS OF HYDRODYNAMICS BY MILNE-THOMSON'',
by Ram P. Kanwal. 27 Aug 57, 2p. 3 refs. (MRC Technical summary rept. no. 8)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Hydrodynamics, *Fluid mechanics, *Vector analysis.

AD-286 408 Div. 9
(TISTP/FR) OTS price $2.60

Ohio State U. Research Foundation, Columbus.
A PRELIMINARY STUDY OF THE HYPERSONIC FLOW OF HELIUM-AIR MIXTURES.
Interim technical report on Aerospace Simulation Techniques Research,
by S. L. Petrie. July 62, 22p. incl. illus. 13 refs.
(Contract AF 33(616)5593, Proj. 7065)
(ARL 62-375) Unclassified report

DESCRIPTORS: *Hypersonic flow, Helium, Air, Hypersonic nozzles, Specific heat, Boundary layer.

Theoretical predictions were developed to describe the effects of the addition of varying amounts of helium to the flow of air in a hypersonic wind tunnel. Much greater over-all flexibility in operational Mach number and Reynolds number was demonstrated. Preliminary experimental studies have, in part, substantiated the theoretical predictions. Various possibilities for the use of a helium-air mixture as a wind tunnel testing medium were examined. (Author)

AD-286 503 Div. 9
(TISTP/FR) OTS price $3.60

Naval Ordnance Lab., White Oak, Md.
ON MEASURING THE COEFFICIENT OF DRAG OF AN ACCELEROMETER - INSTRUMENTED SPHERE IN A SHOCK TUBE,
by M. Riess. Oct 62, 26p. incl. illus. tables.
(Rept. no. NOLTR 62-162; Ballistics research rept. no. 81)
Unclassified report

DESCRIPTORS: *Spheres, Drag, Accelerometers, Shock tubes.

The feasibility of measuring the aerodynamic coefficient of drag (C sub D) of a sphere in a shock tube by means of an accelerometer was studied. The method involved mounting an accelerometer within the sphere and measuring its response to a known flow. The range of Mach and Reynolds numbers covered in the tests was limited by the physical parameters of the shock tube used. Based on attenuation and model blockage effects, the tests were limited to a Mach number range of 1.4 to 1.6 and a Reynolds number range of 49,000 to 150,000. A 1.1 in. dia. aluminum sphere was suspended in the test section and 5 shots were made with a constant pressure-ratio across the diaphragm. The values of C sub D reduced from these shots were compared to those found by another experimenter using a ballistics range facility. The agreement, based on Mach and Reynolds numbers, was in most cases of the order of 1 to 4%. (Author)

AD-286 579 Div. 9
(TISTP/WH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CALCULATION OF THE AXISYMMETRIC ISENTROPIC FLOW OF A REAL GAS,
by O. N. Katskova and A. N. Krayko. 29 Aug 62, 14p. incl. illus. (Trans. no. FTD-TT-62-1057 from Zhurnal Vychislitel'noy Matematiki i Matematicheskoy Fiziki 2:1, pp. 125-132, 1962)
Unclassified report

DESCRIPTORS: *Axially symmetric flow, *Gas flow, *Thermodynamics, *Continuum mechanics, *Partial differential equations, *Supersonic nozzles, Digital computers, USSR.

The rise in the temperatures used in aerodynamics requires the development and use of new methods for calculating the flow of a gas having arbitrary thermodynamic properties. The present work is devoted to a calculation of axisymmetrical supersonic nozzles. Experience accumulated in calculating isentropic flows of a real gas using electronic computers is presented. (Author)

AD-286 581 Div. 9
(TISTP/WH) OTS price $5.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
EXPERIENCE IN THE CALCULATION OF PLANE AND AXIALLY SYMMETRIC SUPERSONIC GAS FLOWS BY THE METHOD OF CHARACTERISTICS (Opyt Rascheta Ploskikh I Osesimmetrichnykh Sverkhzvukovykh Techeniy Gaza Metodom Kharakteristik),
by O. N. Katskova, I. N. Naumova and others. 12 Sep 62, 57p. incl. illus. tables, 11 refs.
(Trans. no. FTD-TT-62-205 from Vychislitel'nyy Tsentr AN SSSR Moskva, 1961)
Unclassified report

DESCRIPTORS: *Supersonic flow, *Axially symmetric flow, *Partial differential equations, *Thermodynamics, *Gas flow, *Digital computers, USSR.

The method of characteristics used for the solution of hyperbolic partial differential equations is applied to the calculation of

plane and axially symmetric supersonic gas flows by the method of characteristics. Computer programs adapted for these calculations are described.

AD-286 586 Div. 9, 25
(TISTP/WH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE FLOW OF DISSOCIATING NITROGEN BETWEEN TWO PARALLEL PLATES,
by L. A. Kulonen. 28 Aug 62, 12p. incl. illus. 10 refs. (Trans. no. FTD-TT-62-1145 from Vestnik Leningradskogo Universiteta, Seriya Matematiki, Mekhaniki, Astronomii, No. 1, pp. 116-123, 1962)
Unclassified report

DESCRIPTORS: *Dissociation, *Nitrogen, *Gas flow, *Air, USSR.

AD-286 587 Div. 9
(TISTP/WH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DETERMINATION OF THE HEAT-TRANSFER COEFFICIENTS IN SUPERSONIC TUBE FLOWS OF A RAREFIED GAS,
by A. Ye. Marenov. 7 Sep 62, 14p. incl. illus. 8 refs. (Trans. no. FTD-TT-62-974 from Inzhenernyy Sbornik 30: pp. 139-148, 1960)
Unclassified report

DESCRIPTORS: *Heat transfer, *Supersonic flow, *Pipes, *Laminar boundary layer, Gas flow, USSR.

AD-286 607 Div. 9, 10
(TISTP/WH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
GAS FLOW WITH COMBUSTION IN TUBES WITH POROUS WALLS,
by V. I. Yagodkin. 11 Sep 62, 10p. incl. illus. 2 refs. (Trans. no. FTD-TT-62-1071 from Inzhenernyy Zhurnal 1:3, pp. 165-169, 1961)
Unclassified report

DESCRIPTORS: *Gas flow, *Flame propagation, Pipes, Combustion, USSR, Methanes, Oxygen.

Combustion in tubes with inflow of a combustible mixture through porous walls is treated. In the beginning, a theoretical analysis of flow with combustion under ideal conditions is given. Then, the results of experiments with combustion of a homogeneous air-methane mixture are presented. (Author)

AD-286 613 Div. 9, 25
(TISTP/WH) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NEWS OF THE ACADEMY OF SCIENCES OF THE USSR, DEPARTMENT OF TECHNICAL SCIENCES, MECHANICS AND MACHINE BUILDING (SELECTED ARTICLES).
10 Sep 62, 38p. incl. illus. table, 9 refs. (Trans. no. FTD-TT-62-494 from Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Mekhanika i Mashinostroeniye, No. 6, pp. 3-10, 15-25, 1961)
Unclassified report

DESCRIPTORS: *Blunt bodies, *Laminary boundary layer, *Hypersonic flow, *Superaerodynamics, Partial differential equations, USSR.

Contents:
Solution of Equations of Boundary Layer at Critical Point for Ternary Mixture
Calculation of Axially Symmetric Supersonic Annular Nozzles

AD-286 652 Div. 9, 15
(TISTP/MS) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D.C.
BEHAVIOR OF NON-NEWTONIAN FLUIDS UNDER CONDITIONS OF HIGH PRESSURE RAPID ACCELERATION AND HIGH VELOCITY,
by B. A. Howard, Jr. 1962, 11p. incl. illus. 8 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, N.Y.

DESCRIPTORS: *Fluid flow, Impact shock, Stresses, Shear stresses, Pressure, Acceleration, Velocity, Viscosity, Elasticity, Functions, Mathematical analysis, Equations.

An investigation of the basic relationships which describe the flow of non-Newtonian fluids under conditions of impact loading, possible plastic flow, and short periods for the various conditions. A generalization of the Navier-Stokes equation is proposed for non-Newtonian fluids in which the stress is proportional to a power n of the rate of strain. Results show that the ratio of the transverse to the longitudinal strain is not a constant but a function of time or of strain and depends strongly upon the visco-elastic response of the medium as well as on the loading conditions. The pronounced effect of volume-viscosity on the shape of this function is illustrated. (Author)

AD-286 666 Div. 9
(TISTP/MS) OTS price $1.00

Diamond Ordnance Fuze Labs., Washington, D. C.
FLUID AMPLIFICATION. 2. FLOW VISUALIZATION-COMPRESSIBLE FLUIDS,
by Jorma R. Keto. 20 Aug 62, 45p. incl. illus. (DOFL rept. no. TR-1041)
(DOFL Proj. 31100) Unclassified report

DESCRIPTORS: *Pneumatic systems, *Compressible flow, *Optical systems, *Schlieren photography, Optics, Test methods, Fluid flow.

A study was made on the methods generally used in flow visualization and their applications to pure fluid systems. Comparison details of the shadowgraph, schlieren, and interferometer techniques are reported; also, a generalized equation is derived for the schlieren method, relating light intensity to gas density for two-dimensional flow. Construction details are presented on two schlieren-type systems, together with illustrated results of typical images obtained. Improved visualization techniques were realized using helium, volatile liquids, and condensible vapor. A technique was developed for sealing interchangeable pure fluid elements to optical windows permitting repeated use without replacing the sealing materials or cleaning windows. Additional data will be issued on the basic principles and techniques applicable to pure fluid systems. (Author)

10. FUELS AND COMBUSTION

AD-285 825 Div. 10
(TISTP/MS) OTS price $7.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CALCULATION OF FLAME PROPAGATION IN TURBULENT

FLOW,
by Ye. S. Shchetinkov. 20 June 62, 71p. incl. illus. tables, 16 refs. (Trans. no. FTD-TT-61-181 from Goreniye v Turbulentnom Potoke. Moscow, Izdatel'stvo Akademii Nauk SSSR, pp. 5-50, 81-87, 1959)
Unclassified report

DESCRIPTORS: *Flames, *Turbulent flow, Mathematical analysis, Combustion, Velocity, Temperature, Pressure, Theory, Propagation, Mathematical prediction.

This method for calculating flame propagation in turbulent flow makes it possible to perform a quantitative numerical analysis of the influence of various parameters of the flow and the fuel mixture (initial temperature, pressure, velocity, turbulence parameter, etc.) on characteristics of burning such as flame velocity, width of the combustion zone, and tongue stability. This model is applicable only for those combustion regimes for which the model of microvolume burning is realized. A comparison of the calculation results with experimental observations shows satisfactory qualitative correspondence. An accurate quantitative comparison is impossible at present due to the lack of the necessary initial data on the total kinetics of burning and the kinematic structure of turbulent flow, and also because of the imperfections in the calculation method. (Author)

AD-285 938 Div. 10
(TISTM/SJR) OTS price $1.60

Callery Chemical Co., Pa.
FORCED CONVECTION HEAT TRANSFER CHARACTERISTICS OF LIQUID PENTABORANE,
by J. P. Cherenko. Sep 62, 14p. incl. illus. table, 9 refs.
(Contract NOa(s) 58-454-d)
Unclassified report

DESCRIPTORS: *Liquid rocket propellants, *Pentaboranes, Thermodynamics, Convection, Surface temperatures, Nucleate boiling, Decomposition, Rocket cases, Rocket motor nozzles, Fouling, Heat transfer, Coolants.

The heat transfer characteristics of liquid pentaborane under conditions of forced convection were measured at velocities of 20 and 65 feet per second and at heat fluxes to 2 BTU per square inch - second. Liquid pentaborane is unsatisfactory as a coolant at high heat fluxes because pentaborane decomposition results in rapid heat transfer surface fouling. Fouling rates appeared to increase at the higher heat fluxes, probably because of increased transfer surface temperatures. No evidence of nucleate boiling was obtained in the experiments. Operation at heat fluxes believed necessary for nucleate boiling heat transfer was impractical because of the high fouling rate at these high heat fluxes and wall temperatures. (Author)

AD-285 952 Div. 10, 4
(TISTM/TCG) OTS price $3.60

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
FLAME INHIBITION RESEARCH.
Quarterly progress rept., 1 May-31 July 62,
by R. M. Fristrom, W. G. Berl and others.
Aug 62, 25p. incl. illus. tables (Rept. no. TG 376-7)
(Contract NOw 62-0604-c)
Unclassified report

DESCRIPTORS: *Flames, *Combustion, *Oxidation inhibitors, *Methanes, *Oxygen, Hydrogen compounds, Bromides, Additives, Iodides, Fire extinguishers, Diffusion, Hydrogen, Argon, Methyl radicals, Chemical reactions, Reaction kinetics, Flame propagation, Flame arresters, Heavy water, Gases.

The flat flame burner system is in operation. Two runs were made on the lean uninhibited methane-oxygen flame to study the concentration of methyl radical. Methyl radicals were detected using iodine in the scavenger sampling probe, and a preliminary composition profile is presented. The low pressure flow reactor was modified for the study of radical reactions in the range 300 to 600 K. A study of the products of reaction of HBr with the effluent from a heavy water discharge (D, OD, and O) suggests that the reactions of O and/or OD may be more complex than the usually assumed. It was found that O atoms react with methyl iodide to give a bright yellow atomic flame. Formaldehyde is a major product. The reaction of methane with OH radicals was studied from 300 to 600 K. Methods were investigated for the preparation of DBr for isotopic tracer studies in flames. (Author)

AD-286 068 Div. 10, 30
(TISTM/SJR) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
AN APPARATUS FOR MEASURING THE BULK MODULUS OF SOLID PROPELLANTS,
by Neal C. Wogsland. 1962, 12p. incl. illus. 15 refs.
Unclassified report

Presented at the 1962 Army Science Conference, 20-22 June 1962 at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Solid rocket propellants, Elasticity, Mechanical properties, Storage, Deformation, Test equipment, Hydrostatic pressure, Measurement, Stresses.

An apparatus was developed to measure the equilibrium bulk modulus of solid propellants and other visco-elastic materials at pressures between 0 and 2500 psig. Hydrostatic pressure is applied to a test sample in the high-pressure chamber of a pressure intensifier. Measurement of the volume displaced by the low-pressure end of the double piston provides high sensitivity in the measurement of the volume change in the high-pressure chamber. The measured isothermal modulus is sufficiently accurate for use in quasi-static stress analysis of solid-propellant rockets. In addition, the adiabatic bulk modulus can be estimated from pressure-volume-temperature data. Small voids in a propellant are vividly shown by a very fast initial rise in the curve of pressure vs. volume change. (Author)

AD-286 123 Div. 10
(TISTM/TCG) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
HETEROGENEOUS COMBUSTION IN A SYSTEM CONTAINING CONDENSED COMPONENTS,
by N. N. Bakhman and D. P. Polikarpov.
5 June 62, 17p. incl. illus. ref. (Trans. no. FTD-TT-62-709 from Izvestiya Akademii Nauk SSR. Energetika I Avtomatika, No. 4, pp. 37-42, 1961)
Unclassified report

DESCRIPTORS: *Solid jet engine fuels, *Combustion, *Flame propagation, Solids, Fuels, Inorganic substances, Oxidizers, Potassium compounds, Perchlorates, Chlorates, Barium compounds, Oxides, Polymers, Methyl radicals, Acrylic resins, Ethylenes, Styrenes, Vinyl chlorides.

This investigation was devoted to a study of the propagation of a flame along a plane and a cylindrical surface of contact of a number of solid inorganic oxidizing agents incapable of burning in their pure form ($KClO_4$, $KClO_3$, $KMnO_4$, BaO_2) and solid fuels: polymethyl methacrylate (Plexiglas), polyethylene, polystyrene, polyvinyl chloride (vinyplast), and others. The tests were conducted in N at the pressures from 0 to 100 atm (gage). (Author)

AD-286 380 Div. 10, 4
(TISTM/MSH) OTS price $2.60

Rocketdyne, Canoga Park, Calif.
RESEARCH IN FLUORINE CHEMISTRY.
Quarterly progress rept. no. 19, 16 June-15 Sep 62,
by H. H. Rogers, J. H. Johnson, and S. Evans.
10 Oct 62, 22p. incl. illus. table, 7 refs.
(Rept. no. R-334-19)
(Contract Nonr-181800)
Unclassified report

DESCRIPTORS: *Fluorides, *Oxyfluorides, *Nitrogen compounds, *Hydrogen compounds, *Oxygen compounds, *Dioxides, *Rocket oxidizers, *Electrolysis, Ammonia, Oxygen, Electrochemistry, Anodes, Electrodes, Oxidation, Synthesis, Materials.

Electrolyses of the HF-N_2O_4 system have shown that OF_2, NO_3F, and O_3 are not obtained at a mole ratio of HF:N_2O_4 of 2:1, as they had been at ratios near 30:1. An analysis of the work on the HF-N_2O_4 system is included. Research on systems containing less oxygen has begun with a program on the system HF:NH_3:'O'. Initial work on the system HF:NH_3 has shown that NF_3 can be prepared at low NH_3 concentrations in agreement with the work of Schmeisser. Research has also been started on the HF-FNO system. Observation of the potential profile of the anode in the HF-NO system as a function of applied current in a three electrode system confirmed the previously proposed mechanism for anodic oxidation. In effect, the nature of the nickel electrode in these systems is critical in determining the anodic oxidation products of electrolysis. Under seemingly identical conditions OF_2 is the principal product when the electrode is passive, whereas NO_3F is the major product where passivity is not accomplished. (Author)

AD-286 462 Div. 10, 25
(TISTM/REB) OTS price $5.60

Aeronutronic, Newport Beach, Calif.
THERMODYNAMIC PROPERTIES OF ROCKET COMBUSTION PRODUCTS.
Final rept.,
by D. L. Hildenbrand and L. P. Theard.
31 July 62, 54p. incl. illus. tables, 23 refs.
(Pub. no. U-1784)
(AF 04(611)7442) Unclassified report

DESCRIPTORS: *Combustion chamber gases, *Beryllium compounds, *Beryllium, *Thermodynamics, Solid rocket propellants, Combustion, Oxygen, Hydrogen, Mass spectroscopy, Water vapor, Oxides, Rocket motors.

A review of previous studies of vapor species in the beryllium-oxygen-hydrogen system at high temperatures is presented. Mass spectrometric studies of the reaction of water vapor with beryllium oxide were carried out at temperatures up to 2600 K. A tentative lower limit of -181 kcal/mole for the heat of formation of $Be(OH)_2(g)$ at 298 K was derived from mass spectral data. A mixture of beryllium metal and beryllium oxide in a W effusion cell in the mass spectrometer indicated Be(g) in the effusing vapor at temperatures up to 1800 K. No evidence for Be2(g) and Be2O(g) was found in the same temperature range. Mass spectra for the Be-BeO mixture in the presence of water vapor contained no measurable intensities of BeOH(+) at 1800 K. A lower limit of -21 kcal/mole was tentatively derived for the heat of formation of BeOH(g) at 298 K. The vaporization of beryllium oxide and its reaction with W were studied from 2300-2600 K. The heats of sublimation of $(BeO)_3(g)$ and $(BeO)_4(g)$ at 2354 K determined by the second-law method are -180 and -198 kcal/mole, respectively. A new table of thermodynamic functions, based upon recently reported heat-content data, was compiled for condensed BeO. (Author)

AD-286 558 Div. 10
(TISTM/ODN) OTS price $4.60

Southwest Research Inst., San Antonio, Tex.
STUDIES OF INTERNAL DISPLACEMENTS IN SOLID PROPELLANT GRAINS (PHOTOELASTIC OBSERVATIONS USING TOLYLENE DI-ISOCYANATE POLYURETHANE).
Interim rept.,
by Douglas Bynum, Jr. and Leonard U. Rastrelli.
20 Aug 62, 34p. incl. illus. tables, 11 refs.
(Contract Nonr-336300, Proj. 1043-3)
Unclassified report

DESCRIPTORS: *Solid rocket propellants, *Propellant grains, *Urethanes, Polymers, Cyanates, Photoelastic materials, Coatings, Rubber, Hardness, Stresses, Tests, Elasticity, Mechanical properties, Physical properties, Temperature, Rocket motors, Photoelasticity.

A need exists for a birefringent material, having phenomenological characteristics similar to solid propellants, which can be used in photoelastic studies for grain design in rocket engines. The preliminary investigations indicate that tolylene di-isocyanate polyurethane would be a satisfactory and useful photoelastic material for grain design applications. (Author)

AD-286 559 Div. 10, 25
(TISTM/ODN) OTS price $3.60

Southwest Research Inst., San Antonio, Tex.
STUDIES OF INTERNAL DISPLACEMENTS IN SOLID PROPELLANT GRAINS (EMBEDDED PARTICLE, X-RAY DETECTION SYSTEM).
Interim rept.,
by L. U. Rastrelli and R. C. DeHart. 1 Sep 62,
31p. incl. illus.
(Contract Nonr-336300, Proj. 1043-3)
Unclassified report

DESCRIPTORS: *X-rays, *Detection, *Propellant grains, X-ray generators, Test equipment, Theory, Urethanes, Polymers, Solid rocket propellants.

The X-ray detection facility and the embedded particle technique for obtaining measurements of displacements with models of solid propellant grains are described. (Author)

AD-286 560 Div. 10, 30
(TISTM/EJH) OTS price $3.60

Southwest Research Inst., San Antonio, Tex.
STUDIES OF INTERNAL DISPLACEMENTS IN SOLID PROPELLANT GRAINS (ESTIMATING EXPERIMENTAL ERRORS IN X-RAY DETECTION FACILITY).
Interim rept.,
by L. U. Rastrelli and B. J. Pape. 5 Sep 62,
26p. incl. illus. table.
(Contract Nonr-336300, Proj. 1043-3)
Unclassified report

DESCRIPTORS: *Propellant grains, *Stresses, Solid rocket propellants, Particles, Radio-

graphic analysis, Nondestructive testing, X-rays, Errors, Scattering, Mathematical analysis.

The procedure is described for obtaining estimates of experimental errors associated with the X-ray detection - embedded particle technique for measuring internal displacements in solid propellant grains. (Author)

11. GROUND TRANSPORTATION EQUIPMENT

AD-286 015 Div. 11
(TISTE/CRJ) OTS price $1.60

Army Transportation Board, Fort Eustis, Va.
ENVIRONMENTAL PROGRAM 1962-1966.
25 July 62, 10p. incl. illus.
Unclassified report

DESCRIPTORS: *Military transportation, *Logistics, Tropical regions, Arctic regions, Desert tests, Terrain, Transportation, Vehicles, Cargo vehicles, Tracked vehicles.

AD-286 016 Div. 11
(TISTE/JBM) OTS price $2.60

Army Transportation Board, Fort Eustis, Va.
TIRES, OVERSIZE, SPECIAL AND DESERT PHASE I: TROPICAL EVALUATION.
July 62, 24p. incl. illus. 4 refs.
(Proj. no. TCB 61-123-EV)
Unclassified report

DESCRIPTORS: *Tires, *Cargo vehicles, Tests, Tropical regions, Vehicles, Desert tests, Maneuverability.

Tropical evaluation of a variety of oversize, special, and desert tires was made to determine the suitability of oversize tires to improve vehicle mobility over jungle terrain. Selected tires were installed on military and commercial vehicles and the evaluation determined the go and no go of the vehicles during an overland traverse from Chepo to Santa Fe in Panama. This evaluation demonstrated that oversized low pressure tires provide greater vehicle mobility than standard military tires.

AD-286 041 Div. 11, 22
(TISTW/PCR) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
DYNAMIC SIMULATOR,
by F. Pradko. 1962, 14p. incl. illus.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, United States Military Academy, West Point, New York.

DESCRIPTORS: *Dynamics, *Vehicles, *Control simulators, Equations, Terrain models, Display systems, Pitch, Roll, Yaw, Mathematical analysis, Shock, Vibration, Recoil mechanisms, Acceleration, Stability, Simulation.

A series of integrated research programs concerned with analytical and experimental investigation of vehicle reactions to impact forces is described. The program presents: (1) equations of vehicle dynamics; (2) techniques for generating random terrain profiles; (3) a unique motion simulator and, (4) a three-screen visual display system. The simulator described is a high amplitude device that is capable of producing random motions of bounce, pitch, roll and yaw. This investigation has led to a substantial improvement towards analytical and physical understanding of vehicle behavior. Mathematical models are presented with significant comparisons made between computer studies and experimental evidence. The presentation enables a relative assessment of the Army's inhouse progress in the simulation field. (Author)

AD-286 426 Div. 11
(TISTE/CAM) OTS price $4.60

Army Transportation Board, Fort Eustis, Va.
CARRIER, TRACKED, 5-1/2-TON (NODWELL RN 110D) PHASE I: SUBARCTIC EVALUATION.
Final report on Phase I.
Sep 62, 39p. incl. illus. 5 refs. (Rept. no. TCB-62-182-EV)
Unclassified report

DESCRIPTORS: *Tracked vehicles, *Cargo vehicles, Arctic regions, Climatic factors, Test methods, Temperature, Velocity, Terrain, Maneuverability, Maintenance, Failure (Mechanics).

The nodwell carriers RN 110D-1 and RN 110D-2 are highly mobile tracked cargo carriers, each capable of traversing difficult terrain with a payload of 11,000 pounds. Although these vehicles were designed primarily as cargo vehicles, they also have a limited towing capability. The steering system is air controlled, hydraulically actuated, with controlled differential, equipped with outer planetary reduction gears. The controlled differential can also be used for braking by activating the steering levers simultaneously. The vehicles have four axles; each axle supports two 12-ply pneumatic tires. Each wheel has an independent crank arm with torsion spring suspension, allowing considerable independent vertical movement. Each track consists of two parallel 15-inch wide belts of nylon-cotton reinforced rubber, connected by heat-treated spring steel grouser bars, that extend the width of the track. The tires ride in a concave pocket formed in the center of the grouser bars. Power is transferred from the differential to the track by rear-drive sprockets of steel overlaid with rubber or cast iron. (Author)

AD-286 769 Div. 11
(TISTE/JBM) OTS price $1.10

Army Airborne, Electronics and Special Warfare Board, Fort Bragg, N. C.
SERVICE TEST OF THE ARMORED PERSONNEL CARRIER, FT, M113E1, FOR AIR DELIVERY AND AIR TRANSPORT.
29 Aug 62, 3p.
(Proj. AB 362)
Unclassified report

DESCRIPTORS: *Cargo vehicles, *Armored vehicles, *Tracked vehicles, Airborne, Tests, Air transportation, Air drop operations, Military personnel, Transportation.

Tests were conducted to determine: (1) suitability of the Carrier, Personnel, FT, Armored, M113E1, for air delivery and air transport; (2) Suitable air delivery kits and rigging techniques; and (3) suitable air transport procedures. It was concluded that the Carrier, Personnel, FT, Armored, M113E1, is suitable for

air delivery and air transport and that the air delivery kit, rigging techniques, and air transport procedures determined for the Carrier, Personnel, FT, Armored, M113E1, are suitable for Army use. (Author)

AD-286 802 Div. 11
(TISTE/CRJ) OTS price $2.60

Army Transportation Board, Fort Eustis, Va.
CARRIER, TRACKED, ARTICULATED, 20-TON (MUSKOX) PHASE II: SUBARCTIC EVALUATION.
Final rept.,
Oct 62, 23p. incl. illus. (Rept. no. TCB-61-127-EV)
Unclassified report

DESCRIPTORS: *Tracked vehicles, *Cargo vehicles, Arctic regions, Tests, Logistics, Maintenance, Safety.

Efforts were made to determine the suitability of the Muskox as a heavy logistical transporter in support of subarctic military operations. The evaluation item is a heavy duty carrier designed for cargo transport in the muskeg areas of Canada in support of oil field development. It is a bellyless tracked vehicle using hydraulic servo-joint articulated two piece design with power applied to all four tracks. Vehicle may be separated into two units for shipping. The front unit can run and maneuver under its own power; however, the rear unit is unpowered when disconnected. It was concluded that there is no requirement for vehicles of this capacity (20-ton) for support of Battle Group sized operations, but that a requirement does exist for limited numbers of vehicles with this capability for use as heavy load, special purpose transporters for armored vehicles and engineer equipment. It is recommended that the Muskox be considered a suitable interim vehicle to satisfy this requirement. (Author)

12. GUIDED MISSILES

AD-285 685 Div. 12
(TISTW/PCR) OTS price $4.60

Naval Ordnance Lab., White Oak, Md.
RE-ENTRY TRAJECTORIES OF LIFTING BALLISTIC MISSILES,
by E. L. Harris. 24 Aug 62, 8p. illus. 3 refs. (Rept. no. NOLTR 62-63)
Unclassified report

DESCRIPTORS: *Guided missile trajectories, *Re-entry vehicles, Lift, Drag, Gravity, Configuration, Aerodynamics, Motion, Equations, Mathematical analysis, Guided missiles (Surface-to-surface).

Calculations of re-entry trajectories of lifting ballistic missiles with total ranges from 1000 to 7000 nautical miles were carried out on an IBM 7090 computer. The re-entry calculations began at an altitude of 400,000 ft under the assumption that the vehicle was launched on a minimum energy trajectory. Values of the ballistic factor, from 200 to 1200 lb sq ft and lift-to-drag ratios from -0.6 to +0.6 were considered. (Author)

AD-285 698 Div. 12, 1
(TISTA/GEC) OTS price $1.60

4750th Test Squadron (Tactics and Application Engineering) Tyndall Air Force Base, Fla.
MB-1 TACTICAL FERRY SAFETY STUDY F-101B/F AND F-106A/B.
Final rept.,
by Paul E. Blease. 22 May 62, 11p.
(Proj. ADC/73AD/62-7)
Unclassified report

DESCRIPTORS: *Rockets, Aviation safety, Jet fighters, Nuclear warheads, Jettisonable equipment, Logistics, Air to air, Aircraft ammunition, Air transportation.

Data were obtained for a MB-1 Tactical Ferry Safety Study on the F-101B/F and F-106A/B aircraft. MB-1T's were loaded, on both types of aircraft, in accordance with the Tactical Ferry Procedures. It was determined that weapons configured for tactical ferry cannot be fired and consequently the nuclear warhead cannot be detonated. However, if the weapon is jettisoned, a one point detonation will probably occur upon impact with the ground. It is recommended that tactical ferry procedures as outlined in T. O. 1F-106A-29 and T.O. 1F-101B-29, with one exception, be utilized during MB-1 ferrying. T.O. 1F-101B-29 should be amended to read: 'Aft umbilical plug - connected' rather than 'Aft umbilical plug - disconnected and stowed.' (Author)

AD-285 830 Div. 12
(TISTW/PCR) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
FROM ''BULLETS WHICH RUN AND FLY'' TO COSMIC ROCKETS,
by N. Balakin. 20 Aug 62, 4p. (Trans. no. FTD-TT-62-1006 from Kryl'ya Rodiny 5: pp. 18, 1959)
Unclassified report

DESCRIPTORS: *Satellite vehicles, Satellite vehicle research, Sounding rockets, Liquid rocket propellants, USSR.

AD-285 834 Div. 12
(TISTA/SEB) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
RETURN TO EARTH,
by B. Stepanov. 29 June 62, 2p. (Trans. no. FTD-TT-62-853 from Krasnaya Zvezda, p. 4, 17 May 1960)
Unclassified report

DESCRIPTORS: *Re-entry vehicles, Jet engines, Aerodynamic heating, Load distribution, USSR, Translation, Deceleration.

AD-285 868 Div. 12
(TISTA/SEB) OTS price $4.60

Rocketdyne, Canoga Park, Calif.
LAUNCH AREA PREPARATION AND CHECKOUT; LOGICAL FUNCTION REPORT ON OSTF-1 HUMAN FACTORS--PERSONNEL SUBSYSTEM TEST OBJECTIVES (ATLAS MA-3 ENGINE SYSTEM),
by F. S. Hall and G. A. Peters. 15 Aug 62, 46p. incl. illus. tables, refs. (Rept. no. R-3774)
(Contract AF 04(694)8)
Unclassified report

DESCRIPTORS: *Launching sites, Ground support equipment, Maintenance personnel, Errors, Effectiveness, Guided missiles, Rocket motors, Booster rockets, Reliability, Liquid rocket propellants, Human engineering.

A total of 101 incidents involving the Atlas MA-3 engine system was reported as part of an operational system test and evaluation program conducted at Vandenberg Air Force Base, California. Knowledge of these incidents was obtained by direct observation of the launch area preparation and checkout job operations. Eighty human factors problems were identified and analyzed in relation to safety, training, organizational controls, technical data, personnel selection and manning, and design of engine hardware, aerospace ground equipment, and missile hardware. (Author)

AD-286 069 Div. 12, 15
(TISTP/WH) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
A MATHEMATICAL MODEL FOR A BALLISTIC ROCKET,
by Everett L. Walter. 1962, 10p. 10 refs.
Unclassified report

Presented at the 1962 Army Science Conference, 20-22 June 1962 at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Rockets, *Guided missiles, *Ballistics, *Guided missile trajectories, *Differential equations, *Digital computers, *Numerical analysis.

The importance of mathematical models in designing a rocket is apparent in savings of time and money. Testing of certain theories of rocket flight can be done only by mathematical models. Such a model is given for a ballistic rocket, one for which there is no guidance after launching. It consists of six simultaneous differential equations which can be numerically solved rather quickly on a high-speed computer. All necessary parameters are completely defined, but the equations of motion are given without proof. The use of perturbation equations, which describe changes in the trajectory due to small changes in the atmospheric or rocket data, is discussed, indicating how their use can greatly increase computing speed. Numerical integration of the equations is discussed, together with the characteristics one would desire in a computer program which make the model as complete and flexible as possible. Some indication of computing speed is given, as well as the time required to program the model for a high speed computer. Finally, several applications for which the model was designed are discussed. (Author)

AD-286 076 Div. 12, 27
(TISTM/EJH) OTS price $1.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
PROPULSIVE SYSTEM SPECIFIC IMPULSE,
by F. W. Ross. 8 Feb 60, 15p. incl. illus.
(Rept. no. GAMD-1293)
(Contract AF 29(601)2207, Proj. 52)
Unclassified report

DESCRIPTORS: *Specific impulse, Propulsion, Rocket propulsion, Nuclear propulsion, Theory, Mathematical analysis.

The specific impulse of a propellant, I sub sp, is known to be inadequate by itself as a measure of the resulting effectiveness of a propellant system. With developments now extending toward newer types of propulsive systems, including liquid hydrogen and nuclear systems, the considerable differences in masses of propulsive equipments point up the need of an improved measure for such system effectiveness. A propulsive system specific impulse, I sub ss, is derived to fulfill this need. It includes the relative mass of equipment required by the propulsive system, as well as the I sub sp of the propellant. The resulting analytical expression for I sub ss brings out salient features of the propulsive system induced by differences in structural mass factors (other than payload masses). Specifically it shows: the nature of the minimum cutoff I sub sp, induced by the structural factor for each magnitude of mission velocity. If I sub sp is below this, the mission cannot be accomplished. For I sub sp increased above this cutoff value, I sub ss increases logarithmically to a theoretical limit determined again by the structural factor and mission velocity. (Author)

AD-286 077 Div. 12, 27, 10
(TISTA/SEB) OTS price $3.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
SPACE SYSTEM SPECIFIC IMPULSE,
by F. W. Ross. 22 July 60, 35p. incl. illus. tables, 5 refs. (Rept. no. GA-1538)
(Contract AF 29(601)2207)
Unclassified report

DESCRIPTORS: *Nuclear propulsion, *Specific impulse, *Booster rockets, Rocket motors, Rocket propulsion, Liquid rocket propellants, Velocity, Staging, Space flight, Launching, Mathematical analysis, Theory, Effectiveness.

The system specific impulse (Iss) was determined to be the equivalent of specific impulse (Isp) of an idealized system having the same net effectiveness as the actual system but with zero mass of all structural equipment except the payload. The Iss for chemical and nuclear propelled launch vehicles is compared on the basis of specific impulse, structural factors, equivalent velocities, and number of stages. With Iss, it is possible to separate the system net effectiveness of a multistage vehicle from the downgrading of payload-carrying capabilities introduced by the staging and to recognize that the system effectiveness for each stage is proportionate, or that it is a simple summation if the staging is non-proportionate.

AD-286 080 Div. 12, 22
(TISTW/PCR) OTS price $1.10

Magnavox Co., Urbana, Ill.
SOLID-STATE ARM SAFE DEVICE.
Monthly progress rept. no. 5, 1 May-1 June 62,
by L. W. Ricketts. 4 June 62, 4p.
(Contract DA 11-022-ORD-4048)
Unclassified report

DESCRIPTORS: *Arming devices, *Guided missile warheads, Solid state physics, Configuration, Power supplies, Electric switches, Safety, Guided missiles (Tactical).

AD-286 081 Div. 12, 22
(TISTW/PCR) OTS price $1.10

Magnavox Co., Urbana, Ill.
SOLID-STATE ARM SAFE DEVICE.
Monthly progress rept. no. 6, 1-30 June 62,
by L. W. Ricketts. 6 July 62, 4p.
(Contract DA 11-022-ORD-4048)
Unclassified report

DESCRIPTORS: *Arming devices, *Guided missile warheads, Solid state physics, Electric switches, Power supplies, Safety, Guided missiles (Tactical).

AD-286 103 Div. 12
(TISTA/VGW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE SPACE AGE,
by A. Bakulev. 5 June 62, 6p. (Trans. no. FTD-TT-62-599 from Newspaper article (Title Uknown))
Unclassified report

DESCRIPTORS: *Space flight, *Spaceships, Translations, USSR.

AD-286 141 Div. 12
(TISTA/SEB) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AN OUTSTANDING SCIENTIFIC EXPERIMENT,
by Ye. P. Aksenov, Ye. A. Grebenikov, and V. G. Demin. 1 June 62, 21p. incl. illus. (Trans. no. FTD-TT-62-653 from Priroda, No. 8, pp. 7-15, 1961)
Unclassified report

DESCRIPTORS: *Space flight, Translations, Manned, Spaceships, Booster rockets, Motion, Satellite vehicles, Satellite vehicle trajectories, Celestial mechanics, Space capsules, USSR.

The launching, motion in orbit, and re-entry of Gagarin's Vostok are reported.

AD-286 173 Div. 12
(TISTA/SEB) OTS price $4.60

Rosemount Aeronautical Labs., U. of Minn., Minneapolis.
EVAPORATIVE FILM COOLING AT HYPERSONIC VELOCITIES FOR RE-ENTRY VEHICLES,
by Rudolf Hermann and W. L. Melnik. Apr 61, 32p. incl. illus. 18 refs. (Rept. no. RAL RR 178)
(Contract AF 49(638)190)
(AFOSR-669) Unclassified report

DESCRIPTORS: *Film cooling, *Re-entry vehicles, Blunt bodies, Temperature, Heat transfer, Feasibility studies, Friction, Evaporation, Hypersonics, Wind tunnel models, Model tests, Atmosphere entry, Cooling.

A theoretical analysis of similarity parameters of evaporative film cooling was developed for blunt bodies indicating the effect of mass transfer on heat transfer and skin friction for Prandtl and Lewis numbers unity. Calculated interface temperatures are in good agreement with wall temperatures measured around a hemisphere in a hypersonic wind tunnel. Application of the analysis shows that evaporative film cooling is feasible for typical re-entry vehicles. At circular velocities the effective heat of evaporation of water is as high as 11,000 Btu/lbm. The significant advantage of evaporative film cooling is that the walls of a vehicle during re-entry are maintained at relatively low temperatures. (Author)

AD-286 248 Div. 12
(TISTA/SEB) OTS price $1.10

Aerospace Information Div., Washington, D. C.
PREPARATION FOR FLIGHT OF "VOSTOK-2",
by L. Mar'yanin. 24 Sep 62, 2p. (AID rept. 62-152; Trans. from Second Launching Into the Cosmos. Pravda 4, Cols. 1-3, 4 Aug 62; 6, cols. 1-3, 5 Aug 62)
Unclassified report

DESCRIPTORS: *Satellite vehicles, Research program administration, Launching, Preparation, Scheduling, Manned, USSR.

AD-286 346 Div. 12
(TISTA/SEB) OTS price $4.60

Aeronutronic, Newport Beach, Calif.
INITIAL ORBIT DETERMINATION FROM INDEPENDENT OBSERVATIONS OF SATELLITE POSITION,
by James E. Evans. 1 July 62, 42p. incl. illus. tables (Rept. no. U-1758)
(Contract AF 19(604)7375)
(ESD TDR 62-211)
Unclassified report

DESCRIPTORS: *Orbital flight paths, Computers, Programming, Satellite vehicles, Mathematical prediction, Guided missile tracking systems, Tracking, Determination.

A computer program was developed to compute initial satellite orbits from two or more independent observations of satellite position. The technique combines other observations with the initial elements by means of a differential correction scheme to obtain a corrected initial orbit. Extensive experimentation indicates that appropriate selection of observations to be used in the initial computations will yield accurate initial orbits. (Author)

AD-286 512 Div. 12, 9, 6
(TISTA/VGW) OTS price $1.60

AVCO Everett Research Lab., Mass.
A BIBLIOGRAPHY OF AERL RESEARCH NOTES ON RE-ENTRY PHYSICS, PENETRATION AND DISCRIMINATION.
16 July 62, 11p.
Unclassified report

DESCRIPTORS: *Atmosphere entry, *Re-entry aerodynamics, Plasma physics, Thermal radiation, Thermal targets, Detection, Target recognition, Optical tracking, Radar tracking, Guided missile trajectories, Satellite vehicle trajectories, Guided missiles (Surface to surface).

AD-286 554 Div. 12, 6
(TISTW/RD) OTS price $6.60

Melpar, Inc., Watertown, Mass.
APPLICATION OF RECOGNITION THEORY TO MISSILE IDENTIFICATION AND DECOY DISCRIMINATION. VOLUME 3. OPTIMUM DECISION BOUNDARIES.
Final rept. vol. 3,
by Paul W. Cooper. 12 July 62, 63p. incl. illus.
(Contract AF 30(602)2420, Proj. 4983)
(RADC TDR 62-349, vol. 3)
Unclassified report

DESCRIPTORS: *Guided missiles, *Target recognition, *Radar decoys, *Infrared decoys, Statistical distributions, Identification, Statistical analysis.

Statistical classification in n-dimensional space consists in partitioning the space into category regions with decision boundaries and assigning an unknown to the category in whose region it falls. The wide utility is demonstrated of a particular form of decision boundary, the hypersphere, which, while especially easy to implement, is fully optimum for large classes of distributions which may arise in real problems. Of the broad spectrum of distributions described for which the hypersphere is optimum, particular interest centers on the normal, extended-t, and m-paraboloid distributions; and methods for obtaining the boundary parameters are prescribed. Ordering of the coordinate directions according to their relative significance in contributing to the decision is examined, thereby indicating the most efficient reduction of dimensionality where this may be desired in order to allow further computational simplicity. (Author)

Division 12 - GUIDED MISSILES

AD-286 564 Div. 12
(TISTA/GEC) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
BALLISTIC AIRCRAFT OF THE FUTURE,
by A. Shibanov. 29 Aug 62, 6p. incl. illus. (Trans. no. FTD-TT-62-1005 from Znaniye Sila 12: 19p., 1958)

Unclassified report

DESCRIPTORS: *Hypervelocity vehicles, Aerodynamics, Theory, High attitude, Flight paths, Ballistics, USSR.

A study is made of theory of ballistic aircraft (boost-glide vehicles) development in the USSR.

AD-286 568 Div. 12
(TISTP/FR) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE ROTARY MOTION OF ARTIFICIAL CELESTIAL BODIES,
by G. N. Duboshin. 4 Sep 62, 18p. 5 refs. (Trans. no. FTD-TT-62-711 from Byulleten' Instituta Teoreticheskoy Astronomii 7:7 (90) pp. 511-520, 1960)

Unclassified report

DESCRIPTORS: *Satellite vehicles, Rotation, Perturbation theory, Satellite vehicle trajectories.

The problem of motion of an artificial celestial body revolving about a central planet and having a rotatory motion about its own center of inertia is discussed. With certain precisely stipulated assumptions, this problem yields simple partial solutions which may be of practical interest. In these partial solutions, which we call 'regular motions', the center of inertia of the body moves about the planet in a circular Keplerian orbit and the body itself maintains a constant orientation with respect to this orbit. Further consideration is given to the question of stability of the regular motion considered, with respect to the Eulerian angles of the body and their first derivative with respect to time. Two types of artificial bodies are considered, namely the 'elongated' body which in most cases is a homogeneous material section, and the 'compressed' body which in most cases is a homogeneous material flat disk. It is established that in most cases the elongated and the compressed bodies behave in the opposite manner in the sense of stability of regular motion, that is, where a rod is stable a disk is unstable, and vice versa. In conclusion, consideration is given to the question of the influence of the compression of the central body on the regular motion of the celestial body which is rotating about it. (Author)

AD-286 573 Div. 12
(TISTA/SEB) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
TOWARD NEW SUCCESSES IN STUDY OF OUTER SPACE,
by G. S. Titov. 6 Sep 62, 20p. (Trans. no. FTD-TT-62-1189 from Vestnik Akademii Nauk, SSSR 32:7, pp. 10-18, 1962)

Unclassified report

DESCRIPTORS: *Space flight, Satellite vehicles, Manned, Space capsules, USSR.

Titov's speech before the International Committee for Space Research which describes his flight in Vostok-2, is presented.

AD-286 608 Div. 12, 1
(TISTA/SEB) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
FROM AN AIRPLANE TO A SPACESHIP,
by A. Mikoyan. 5 Sep 62, 9p. (Trans. no. FTC-TT-62-1115 from Krasnaya Zvezda, No. 7 (11612) pp. 2-3, 9 Jan 1962)

Unclassified report

DESCRIPTORS: *Aircraft, *Aeronautics, Airplanes, Spaceships, USSR, Translations, Design.

AD-286 627 Div. 12
(TISTA/SEB) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE DETERMINATION OF THE ORBIT OF AN ARTIFICIAL EARTH SATELLITE FROM THREE OBSERVATIONS,
by G. M. Bazhenov. 22 Aug 62, 14p. incl. tables, 4 refs. (Trans. no. FTD-TT-62-590 from Byulleten' Instituta Teoreticheskoy Astronomii 7:10, pp. 757-765, 1960)

Unclassified report

DESCRIPTORS: *Orbital flight paths, Satellite vehicles, Mathematical analysis, Mathematical prediction, Optical tracking, Astronomical data, Determination.

A method is given for determining the initial orbit of an artificial earth satellite from three observations separated by sufficiently long intervals of time. (Author)

AD-286 682 Div. 12
(TISTA/SEB) OTS price $1.10

Aerospace Information Div., Washington, D. C.
CONFIGURATION OF VOSTOK SPACESHIPS.
11 July 62, 5p. incl. illus. 9 refs. (AID rept. no. 62-103)

Unclassified report

DESCRIPTORS: *Satellite vehicles, *Space capsules, Configuration, Design, USSR.

AD-286 852 Div. 12
(TIISTA/GEC) OTS price $1.10

Aerospace Corp., Los Angeles, Calif.
SPACE PHYSICS PROGRAM: SECONDARY PAYLOAD PARTICLE RADIATION EXPERIMENTS FOR PROGRAM 622A SATELLITES.
Semiannual technical note, 1 Jan-30 June 62. 14 Sep 62, 4p. incl. illus. 5 refs. (Rept. no. TDR-69(2260-20)TN-1)
(Contract AF 04(695)69)
(DCAS TDR 62-191) Unclassified report

DESCRIPTORS: *Satellite vehicles, Protons, Proton counters, Electrons, Electron counters, Measurement, Radiation counters, Radiation instruments, Scintillation counters, Astrophysics, Space environmental conditions, Instrumentation.

Five particle-radiation experiments are scheduled to be flown on two Program 622A satellites in the fall of CY 62. Discrete measurements will be made of the proton fluxes between 40 kev and 100 Mev and all protons above 100 Mev and electron fluxes between 40 kev and 7.5 Mev and all electrons above 7.5 Mev. These measurements will supplement those planned for early in CY 63 on the Particle Radiation Mapping (PRAM) Subsatellite Program 11A. (Author)

13. INSTALLATIONS AND CONSTRUCTION

AD-286 269 Div. 13
(TISTM/ODN) OTS price $1.10

Hughes Aircraft Co., Culver City, Calif.
FEASIBILITY AND DESIGN STUDY FOR COLLECTIVE PROTECTION EQUIPMENT FOR THE AN/MSG-4 SYSTEM. PHASE IA.
Monthly progress rept., 1-30 June 62,
by J. Glaser. 19 July 62, 5p. (GSG rept. no. 1183.00/03; FR 62-11-35)
(Contract DA 18-108-cml-6618)
Unclassified report

DESCRIPTORS: *Particulate filters, *Research program administration, Air, Design, Manufacturing methods, Industrial equipment, Materials.

14. MATERIALS (NON-METALLIC)

AD-285 679 Div. 14
(TISTM/TCG) OTS price $1.60

Institute of Paper Chemistry, Appleton, Wis.
DEVELOPMENT OF AN IMPROVED DIFFUSION BOARD MATERIAL.
Monthly rept. no. 21, 29 July-28 Aug 62,
by L. E. Leporte and T. A. Howells. 2 Oct 62, 8p. incl. tables.
(Contracts DA 18-108-405-cml-941 and DA 18-108-cml-6561)
Unclassified report

DESCRIPTORS: *Wood, *Wood pulp, *Plywood, Processing, Additives, Charcoal, Mixtures, Hydrogen ion concentration, Hydraulic presses, Diffusion, Gases.

A series of boards was made at the Wood Conversion Company laboratory in Cloquet, Minnesota. Boards were made with stock similar to the preproduction trial stock with and without sizing using water from the available supplies with and without pH adjustments. This was done in an effort to pin down the factors responsible for the poor gas life performance of the preproduction trial products. Gas life tests run on the boards gave no definite indication that any of the materials involved in the production of this board at Wood Conversion Company would be deleterious at the prescribed addition levels and concentrations. There was a slight indication that the use of the charcoal in a slurry form could result in poor gas life due to leaching and settling before addition. The factors directly affecting the gas life performance of the trial product may have resulted from conditions not readily duplicated in the laboratory. (Author)

AD-285 684 Div. 14
(TISTM/TCG) OTS price $.50

Naval Research Lab., Washington, D. C.
THE EFFECT OF HIGH TEMPERATURES ON THE STABILITY AND IGNITION PROPERTIES OF COMMERCIAL TRIARYL PHOSPHATE FLUIDS,
by A. J. Chiantella, W. A. Affens, and J. E. Johnson. 12 Sep 62, 15p. incl. illus. tables, 21 refs. (NRL rept. no. 5839)
Unclassified report

DESCRIPTORS: *Fluids, *Phenols, *Phosphates, Esters, Hydraulic fluids, Humidity, Hydrolysis, Oxidation, Decomposition, Viscosity, Ignition, High temperature research, Stability.

Commercial triaryl phosphate ester fluids were exposed at temperatures of 200 to 500 F to air of various relative humidities. Hydrolysis, oxidation, and degradation of the esters were followed by titration of the acidic residues and distillates, by measurement of oxygen consumption, and by viscosity measurements of the residues respectively. The resultant residues and distillates contained acids, phenols, tars, and water. The concentrations of these products and the viscosities of the residues exposed at 300 F and above increased significantly as the temperature, relative humidity, and exposure time were increased. The ignition temperatures of the fluids did not decrease significantly, even though extensive degradation of the fluid occurred at 300 F and above. (Author)

AD-285 798 Div. 14
(TISTM/TCL) OTS price $.50

Directorate of Materials and Processes, Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
CRITERIA FOR RUPTURE OF CERTAIN TEXTILE STRUCTURES UNDER BIAXIAL STRESS.
Final rept., Jan-June 62 on Fibrous Materials for Decelerators and Structures,
by Peter Popper. Aug 62, 11p. incl. illus. 4 refs. (Proj. 7320-02)
(ASD TDR 62-613) Unclassified report

DESCRIPTORS: *Textiles, *Fibers, Test methods, Fracture (Mechanics), Shear stresses, Geometry, Friction, Mathematical analysis.

A procedure for determining the combinations of biaxial stress which will cause failure in certain types of fabrics is outlined. Solutions are given for knitted fabrics and diamond structures, and are presented in the graphical form of a rupture envelope. Also, a commonly used rupture criteria for solid materials is included for comparison with the graphic results. (Author)

AD-285 858 Div. 14
(TISTM/ODN) OTS price $2.60

National Bureau of Standards, Washington, D. C.
STRESS RELAXATION IN AERONAUTICAL FASTENERS.
Progress rept. no. 1,
by John H. Gieske. Aug 62, 12p. incl. illus. table, 11 refs. (Rept. no. 7591)
(BuWeps rept. no. RAAE 343 622)
Unclassified report

DESCRIPTORS: *Nuts (Mechanics), *Bolts, Creep, Data, Stresses, Hardening, Bibliography, Aeronautics, Mechanical properties.

Contents:
Correlation of creep data with stress relaxation data
The strain hardening method
The time hardening method
The life fraction method
Construction of creep curves
Comparison of experimental stress relaxation data with calculated stress relaxation data
Estimation of residual stess at 1000 hours
Discussion of the three correlation methods
Correlation of creep data with stress relaxation data for bolt specimens

AD-285 861 Div. 14, 31
(TISTM/EJH) OTS price $3.60

Material Labs., Puget Sound Naval Shipyard, Bremerton, Wash.
MARINE LAMINATING PROPERTIES OF SELECTED WOOD

SPECIES: OUTDOOR EXPOSURE, TWO YEAR EXAMINATION.
Final rept.,
by R. F. England and E. Stahl. July 62, 1v.
incl. illus. tables (Evaluation rept. no. E-412-L2)
Unclassified report

DESCRIPTORS: *Wood, *Plywood, Laminates, Weatherproofing, Resin adhesives, Preservation, Adhesives, Phenolic resins, Resorcinol, Test methods, Reliability, Climatic factors, Ships, Boats.

Natural weathering exposure evaluations made periodically up to two years on a series of domestic, foreign and treated wood laminates showed satisfactory quality on 50 of the 78 speicmens tested. In general, very high density species were unsatisfactory when laminated under process conditions suitable for white oak heartwood. For most species, little delamination increase developed after the first few months of natural weathering. Severity of delamination produced was considerably greater than in accelerated 12-day or 3-hour tests. (Author)

AD-285 954 Div. 14, 17
(TISTM/ODN) OTS price $1.10

Armour Research Foundation, Chicago, Ill.
DEVELOPMENT AND APPLICATION OF A THEORY FOR PLASTIC DEFORMATION OF CEMENTED ALLOYS. TASK 3. COPPER-COOLED TUNGSTEN FIBER ROCKET NOZZLE MATERIALS.
Quarterly rept. no. 4, 1 Jan-31 Mar 62,
by N. M. Parikh. 27 Apr 62, 7p. incl. illus. table.
(Contract DA 11-022-505-ORD-3092, Proj. TB4-002)
(WAL TR 372/32-4-T3) Unclassified report

DESCRIPTORS: *Rocket motor nozzles, *Tungsten, *Copper alloys, Mechanical properties, Alloys, Nickel alloys, Tin alloys, Aluminum alloys, Silver alloys, Lithium alloys, Magnesium alloys, Silicon alloys, Materials, Fibers.

The mechanical properties of 75% dense felts of 0.001 inch diameter W fibers impregnated with Cu-Ni-Si, Cu-Ni-Sn, Cu-Ni-Al, Ag-Li, Ag-Li-Cu, and Ag-Li-Mg matrices were investigated. All composites show good ductility in compression (about 90% reduction in area for the Cu base matrices and 50-65% reduction in area for the Ag base matrices), but very poor ductility (1% elongation, maximum) in tension testing. The addition of a third alloying element to the matrix improves the strength values, but does not alter the ductility. (Author)

AD-285 966 Div. 14
(TISTM/ODN) OTS price $3.60

Material Lab., New York Naval Shipyard, Brooklyn.
COMPOUNDING DEVELOPMENT OF ELASTOMERS FOR GASKETS FOR SUBMARINE HIGH PRESSURE AIR AND OXYGEN SYSTEMS.
Final rept.,
by L. G. Hess and M. Hanok. 20 Sep 62, 31p.
incl. illus. tables (Lab. proj. 6172-2)
Unclassified report

DESCRIPTORS: *Elastomers, *Gaskets, *Synthetic rubber, Gases, Submarines, High pressure research, Air, Oxygen, Polymers, Physical properties, Rubber, Carbon black, Phosphates, Esters, Stresses, Diffusion, Materials.

Compounds based on the fluorinated Viton B polymer were found to possess properties not found in other elastomers. Several carbon black-filled and mineral, lamellar particle filled Viton B compounds were developed. The properties of swelling and oxidative resistance in air at 5,200 psi, and O2 at 3,000 psi, and swelling in phosphate ester and petroleum base lubricants were used as initial screening properties for the compounds developed. The results of the compounding study are presented together with the proposed specification requirements. It was found that the carbon black filled compound ML-G522 was most suitable for the intended purpose and it was so recommended. It was also found that the lamellar filled materials exhibited markedly low swells after high pressure air and O2 exposure but that they are deficient in compression set and elongation properties. A method was developed for determining the volume swell of gasket materials that are subjected to high pressure air or O2. In the course of such exposure, rubber will absorb a considerable quantity of gas which will first expand when the ambient pressure is reduced to atmospheric, causing the rubber to swell, and will then diffuse out of the rubber matrix, allowing the material to return to its initial volume. (Author)

AD-285 980 Div. 14
(TISTM/ODN) OTS price $9.10

Westinghouse Electric Corp., Pittsburgh, Pa.
RESIN SHRINKAGE RELATED TO THE PERFORMANCE OF FILAMENT WOUND STRUCTURES.
Final rept., 1 June 61-31 Aug 62,
by R. N. Sampson, B. Rosen and others.
31 Aug 62, 17p. incl. illus. tables, 17 refs.
(Technical memo. no. 184)
(Contract Nonr-353700)
Unclassified report

DESCRIPTORS: *Filament-wound construction, *Resins, Stresses, Polymerization, Aging, Dilatometers, Strain gages, Tensile properties, Butadienes, Dioxides, Styrenes, Test equipment, Glass, Physical properties.

The polymerization shrinkage of 23 filament winding resin systems was measured. A means of measuring stress was developed and stresses generated in cast samples were determined. Physical properties of composite structures were measured. No relationship was found between resin shrinkage and the composite strength. Resin cracking or a combination of resin cracking and debonding was found to relate to resin shrinkage. The higher shrinkage resins showed more cracking when compared to Epon 826-CL. (Author)

AD-285 982 Div. 14
(TISTM/ODN) OTS price $1.10

National Carbon Co., New York.
FABRICATION AND TESTING OF 103 IN. O.D. X 34 IN. X 70 IN. LONG GRADE CFW GRAPHITE.
Quarterly rept. no. 1, 4 June-31 Aug 62,
by D. E. Muir. 11 Oct 62, 3p. illus.
(Contract AF 04(611)8383, Proj. 623A)
Unclassified report

DESCRIPTORS: *Graphite, *Cylindrical bodies, Carbon, Manufacturing methods, Production, Processing, Rocket motor nozzles, Industrial equipment.

Green carbon cylinders approximately 105 in. O.D. X 32 in. I.D. x 83 in. long were successfully molded using standard base materials. The molded cylinders were loaded into baking furnaces and the approximately twelve-week long heating-cooling cycle was initiated. A review of the progress to date in facility construction, technological scale up, and material processing is presented. (Author)

AD-285 992 Div. 14
(TISTM/ODN) OTS price $1.60

Aeronautical Materials Lab., Naval Material Center, Philadelphia, Pa.
PROPOSED REVISION OF REQUIREMENTS AND TEST METHODS FOR MILITARY SPECIFICATION MIL-H-5606 (HYDRAULIC FLUID, PETROLEUM BASE, AIRCRAFT AND ORDNANCE),
by W. E. MacKenzie. 18 July 62, 7p. incl. illus. tables (Rept. no. NAMC AML-1432)
Unclassified report

DESCRIPTORS: *Hydraulic fluids, *Petroleum, *Specifications, Aircraft, Ordnance, Fluids, Viscosity, Physical properties, Test methods, Tests.

Samples of petroleum base hydraulic fluid for aircraft and ordnance use were investigated with a view towards revising Military Specification MIL-H-5606A. Appendix A lists proposed changes which are intended to control the cleanliness, produce more shear-stable fluids and generally upgrade the requirements of MIL-H-5606A. The changes incorporate many of the suggestions of the Air Force and the aircraft industry. (Author)

AD-286 036 Div. 14
(TISTM/ODN) OTS price $2.60

Cavendish Lab., U. of Cambridge (Gt. Brit.).
A STUDY OF FERROELECTRIC MATERIALS.
Final technical rept., 1 Sep 61-31 Aug 62,
by W. H. Taylor. 25 Sep 62, 18p. illus. 16 refs.
(Contract DA 91-591-EUC-1925)
Unclassified report

DESCRIPTORS: *Ferroelectric materials, *Sodium compounds, *Niobates, Molecular structure, High-temperature research, Single crystals, X-ray photography, Reflection, Radiation effects, Neutron scattering, Barium compounds, Titanates, Chemical bonds, Thallium compounds, Chlorides, Bromides, Dielectric properties, Low-temperature research.

The high-temperature structures of $NaNbO_3$, radiation effects in ferroelectric materials, and neutron scattering with certain hydrogenous materials and materials showing dielectric anomalies are studied. For the study of the structure at high temperatures methods were developed for obtaining X-ray single-crystal photographs up to 900 C. At 540 C a tetragonal perovskite-type structure was confirmed. The super lattice reflexions associated with 2- and 4- sub cell repeats were found at lower temperatures. A ferroelectric material, on irradiation by neutrons, gamma rays or X-rays, acts as a source of electrical energy. Two types of this radiation-sensitivity were observed: one variable and of short time-constant, seen for periods of seconds or minutes after the start of irradiation; the other of long time-constant and stable for months after irradiation. Attempts to correlate radiation-sensitivity and thickness of sample were unsuccessful. The neutron spectra of ferroelectric and paraelectric $BaTiO_3$, and of a number of hydrogen-bonded structures, were studied and partially interpreted. Evidence was obtained for the existence of a dielectric anomaly at about 20 K. in TlCl and 50 K. in TlBr. (Author)

AD-286 063 Div. 14
(TISTM/SJR) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
REPLACING THPC IN THE APO-THPC FLAME-RESISTANT FINISH FOR TEXTILES,
by T. D. Miles, F. A. Hoffman, and A. Merola. 1962, 12p. incl. illus. tables, 9 refs.
Unclassified report

Presented at the 1962 Army Science Conference, 20-22 June 1962 at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Fire resistant textiles, *Phosphine oxides, Phosphonium radicals, Ammonium radicals, Phosphates, Imines, Phosphate coatings, Infrared spectroscopy, Polymers.

An infrared method for the rapid screening of candidate catalysts for the polymerization of APO is described. Of the wide variety of chemicals screened, compounds that are acidic under curing conditions are the most effective catalysts. One of these catalysts, diammonium phosphate, combined with APO produces a new durable flame retardant for cellulosic textiles. (Author)

AD-286 065 Div. 14, 16
(TISTB/MD) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
A NOVEL CARBOHYDRATE REACTION,
by Louis Long, Jr., Derek H. Ball, and A. K. Mitra. 1962, 8p. incl. illus. 16 refs.
Unclassified report

Presented at the 1962 Army Science Conference, 20-22 June 1962 at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Glucosides, *Cancer research, Synthesis.

Under support from the Sugar Research Foundation, plastic materials from sugar were prepared. Patents for new polymers and an effective bonding adhesive for glass have been applied for. The mesylation of methyl a-D-glucopyranoside was examined. From the reaction of methyl a-D-glucopyranoside with 2.2 moles of mesyl chloride, a crystalline compound was isolated in 51% yield. Its structure was proved to be methyl 2,6-di-O-mesyl-a-D-glucopyranoside by a three step synthesis of 3,4-di-O-methyl-D-glucose in a yield of approximately 25%, a considerable improvement on previous syntheses. Upon investigation of an unexpected by-product the direct nucleophilic displacement of a primary mesyloxy group by a methoxide ion was observed, a reaction which does not appear to have been noted previously in the carbohydrate field. In preliminary tests against the Dunning leukemia tumor, methyl 2,6-di-O-mesyl-a-D-glucoside showed activity. This compound is also a key substance in the synthesis of a potential radiation protective material. (Author)

AD-286 066 Div. 14
(TISTM/ODN) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
EVALUATION OF HYPERSONIC PROBE MATERIALS IN A WATER-STABILIZED ELECTRIC ARC AT TEMPERATURES TO 3200 C (5795 F) FOR 60 SECONDS,
by D. J. Molella. 1962, 14p. incl. illus. table, 5 refs.
Unclassified report

Presented at the 1962 Army Science Conference, 20-22 June 1962 at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Refractory materials, *Hypersonics, *Coatings, *Electric arcs, High-temperature research, Heat, Surface tempera-

tures, Physical properties, Thermodynamics, Alloys, Tungsten alloys, Molybdenum, Zirconium alloys, Zirconium compounds, Oxides, Borides, Aluminum alloys, Silicon alloys, Chromium alloys, Silicides, Oxidation, Graphite, Carbides, Water, Coatings.

Mach 8.5 pressure probes were tested to evaluate their behavior during re-entry trajectory heating conditions. A water-stabilized electric arc was used to simulate re-entry heat input of 450 BTU/sq ft-sec to be reached in 25 seconds. Duration of test was 60 seconds. Out of 12 coatings tested on Mo, a sprayed coating of 90W+10ZrO2 exhibited the least damage. Other coatings, Al-Cr-Si, MoSi2, gradated ZrO2 and ZrB2 protected the Mo against catastrophic oxidation. Out of 3 coatings tested on graphite, a vapor-deposited, SiC coating on graphite showed the least damage. American Lava Corp coating and a 90W+10ZrO2, sprayed coating eroded but still protected the graphite against oxidation. Among 8 uncoated materials tested, W and SiC exhibited the least damage. Graphite eroded moderately, however, Mo oxidized catastrophically. (Author)

AD-286 090 Div. 14, 25
(TISTM/ODN) OTS price $1.50

National Carbon Co., Parma, Ohio.
RESEARCH AND DEVELOPMENT ON ADVANCED GRAPHITE MATERIALS. VOLUME II. APPLICATIONS OF ANISOTROPIC ELASTIC CONTINUUM THEORY TO DISLOCATIONS IN GRAPHITE.
Report on Refractory Inorganic Non-Metallic Materials,
by G. B. Spence. July 62, 48p. incl. illus. tables, 27 refs.
(Contract AF 33(616)6915, Proj. nos. 7350 and 7381)
(WADD TR 61-72, vol. 2) Unclassified report

DESCRIPTORS: *Graphite, *Stresses, Theory, Mathematical analysis, Deformation, Elasticity, Surfaces, Crystals, Bibliography.

Eshelby, Read, and Shockley's (Eshelby, J.D. Read, Wit., and Shockley, W., Acta Meta. 1:251 (1953)), theory of dislocations in an anisotropic elastic continuum was used to derive formulas not involving complex numbers for the stress components of straight dislocations in certain symmetry directions. From these the dependence of stacking fault energy, gamma F, on the orientation of the Burgers vector and on the width of extended dislocations and triple partial ribbons and the dependence of gamma F on the radium of curvature of extended nodes were calculated. The results are rigorous for hexagonal crystals and approximate for general directions in (111) planes of FCC crystals. The theory is applied to graphite and close-packed metals. All three methods of determining gamma F for graphite yield results which are compatible with the vale 0.6 + or - 0.2 erg/sq cm. The rough estimate of error is based on uncertainties in the elastic constants and differences in experimental results. (Author)

AD-286 100 Div. 14, 4
(TISTM/TCG) OTS price $1.10

Smith, A. O., Corp., Milwaukee, Wis.
GLASS SURFACE CHEMISTRY FOR GLASS FIBER REINFORCED PLASTICS.
Monthly progress rept. no. 7, 1-30 Sep 62 on Effect of Glass Surface Chemistry on Wetting Bond Strength and Bond Life. 15 Oct 62, 7p. illus. tables.
(Contract NOw 62-0679-c) Unclassified report

DESCRIPTORS: *Glass textiles, *Epoxy resins, *Surface properties, Reinforcing materials, Bonding, Wetting agents, Glass, Laminates, Geometry, Air, Chemical milling.

The remarkable long bond life (more than 95 days) of the untreated alkali-deficient glass surface was further investigated. A lightly sandblasted (roughened) glass surface lasted only seven days. The geometry changes of an air bubble near the glass surface were measured during curing of the surrounding resin. The air bubble moved to and from the glass surface on curing the resin. This movement of the air bubble was attributed to thermal expansion and shrinkage of the air and not to forces created by the curing resin. Even after curing Epon 828(CL) 16 hr at room temperature, the air bubble could move. No significant difference in wetting by water was found between degassed glass surfaces treated with 1/2 and 10% concentrations of A-1100. It was recommended that bond strength testing be discontinued. The results with two test specimen designs showed insufficient reproducibility to distinguish the changes in the glass surface. (Author)

AD-286 116 Div. 14
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DURABLE MATERIALS ''BY COMMAND'',
by M. Shavlovich. 24 May 62, 8p. incl. illus.
(Trans. no. FTD-TT-62-655 from Tekhnika Molodezhi, 10, pp. 22-23, 1961)
Unclassified report

DESCRIPTORS: *Materials, *Plastics, *Cements, Hardening, Industrial plants, Civil engineering, USSR.

AD-286 175 Div. 14, 4
(TISTM/EJH) OTS price $1.00

Rock Island Arsenal Lab., Ill.
THE EFFECT OF OXIDATION ON GREASE LUBRICITY,
by G. P. Murphy. 13 June 62, 38p. incl. illus. tables, 6 refs. (Rept. no. 62-2098)
(Proj. 5B93-21-060)
Unclassified report

DESCRIPTORS: *Lubricants, *Greases, *Oxidation, Mineral oils, Metallic soaps, Deterioration, Decomposition, Infrared spectroscopy, High temperature research, Lithium stearates, Carbonyl radicals, Stability, Test methods.

Commercial and experimental greases were subjected to oxidation by means of pressurized oxygen at elevated temperatures under both static and dynamic conditions. Measurements of penetration, neutralization number, saponification number, carbonyl oxygen and wear were made on the greases before and after oxidation. The main results obtained from this study were: (1) an oxidized grease displays greater wear than the original grease and the maximum wear increase occurs at the temperature at which the grease was oxidized, (2) both soap and oil type affect the oxidation stability and the amount of oxidative wear, (3) oxidation is accelerated by dynamic conditions, (4) the soap acts as a catalyst to both oxidation and oxidative wear, (5) nongaseous oxidation products formed are organic acids, esters, aldehydes, ketones and oil insoluble resinous materials, and (6) oxidative wear is caused by an alcohol soluble, readily neutralized material. (Author)

AD-286 202 Div. 14, 27
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE RESULTS OF PERFORMANCE TESTS OF FIRE-

RESISTANT ''IVVIOL' 1A'' TURBINE OIL,
by K. I. Ivanov, Ye. D. Vilyanskaya and others.
11 June 62, 9p. incl. tables, 3 refs. (Trans. no. FTD-TT-62-715 from Teploenergetika, No. 11, pp. 27-29, 1961)
Unclassified report

DESCRIPTORS: *Turbines, *Oils, *Combustion, *Oxidation inhibitors, Lubrication, Ignition, Viscosity, Stability, Solubility, USSR.

The fire-resistant VTI oil, which is distinguished from turbine oil by its high self-ignition and flash points as well as by its higher specific gravity with respect to its most important aging indices (ability to form precipitates, to form water-soluble acids of high molecular weight) under operating conditions, behaves better than petroleum turbine oil. At the same time it is less inclined to produce foam, to act on the brass grids, and to affect the paranite packing. (Author)

AD-286 230 Div. 14, 1
(TISTM/TCG) OTS price $1.10

General Dynamics/Fort Worth, Tex.
MATERIAL - SEALANT - FIREWALL - APPLICATION, PROCEDURES AND PERFORMANCE OF,
by W. G. Joyce. 9 July 62, 6p. incl. tables.
(Rept. no. FGT-1505)
(Contracts AF 33(038)21250 and AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Fuel seals, *Sealing compounds, *Heat resistant polymers, Seals, High temperature research, Stability, Flames, Vibration, Thermal stresses, Cleaning, Viscosity, Jet bombers.

A sealant is needed to close joggle cracks and voids in the closure rib firewalls on the B-58 so that flash fires originating in an engine compartment may be prevented from spreading beyond the firewall. The firewall sealants tested were EC-1137, EC-1548 and Pro-Seal #700. High-temperature resistance, vibration resistance, flame resistance, fluid (JP-4) resistance, and thermal shock tests were conducted. EC-1137 failed the high temperature, vibration and thermal shock tests. EC-1548 failed thermal shock and the flame test, while Pro-Seal #700 passed all of the tests although its flame resistance was only fair. (Author)

AD-286 231 Div. 14, 30, 27
(TISTM/EJH) OTS price $1.60

General Dynamics/Fort Worth, Tex.
MATERIAL - INTEGRAL FUEL TANK SEALANT - STANDARD EVALUATION TESTS - DEVELOPMENT OF,
by W. G. Joyce. 21 June 62, 13p. incl. illus. tables (Rept. no. FGT-1497)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Fuel tanks, *Seals, Aircraft, High temperature research, Fuels, Rupture, Tensile properties, Failure (Mechanics), Sealing compounds, Coatings, Aluminum, Test methods, Standardization.

The ARTC-W-84 panel of the Aircraft Industries Association has adopted a program to standardize test procedures for both conventional and high temperature sealants. Convair was given as an assignment in the program the investigation of the thermal rupture properties of high temperature sealants and the determination of the effects of fuel immersion on the tensile strength and elongation of conventional sealants. The best rupture test for high temperature sealants is as follows: a 10 psi pressure is applied to a thermal rupture specimen of 1/4 inch hole size in an oven at 275 F for a maximum time of one hour. At the end of that period, the protrusion of the sealant above the level of the panel shall not exceed 1/8 inch. Fuel immersion tests on top-coated tensile-elongation specimens of conventional sealants are feasible. The most suitable fuel immersion period for EC-801 and similar sealants is 7 days. (Author)

AD-286 232 Div. 14, 1
(TISTM/TCG) OTS price $1.60

General Dynamics/Fort Worth, Tex.
WING AND FUSELAGE - INTEGRAL FUEL TANK SEALANTS - IMPROVED HIGH TEMPERATURE (275 F) - PER MIL-S-8802 - EVALUATION OF,
by H. M. Price. 26 June 62, 17p. incl. illus. tables (Rept. no. FGT-1631)
(Contracts AF 33(600)32841 and AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Fuel tanks, *Fuel seals, *Sealing compounds, *High temperature research, Heat resistant polymers, Adhesion, Elasticity, Thermal stresses, Jet bombers, Tests.

Six sealants were submitted for evaluation per MIL-S-8802, the proposed high temperature (275 F) sealant specification. Sealants 3C-1177 and 3C-1055 were lacking in adhesion and elongation properties. Sealant EC-1610 tests showed it to be a long work life, high flow, low strength material possessing excellent adhesion, high temperature, and fuel resistant properties. I-222 had very good high temperature resistance in the thermal shock, thermal extrusion, and thermal rupture tests, but lacked the application and adhesion properties required by the specification. Sealant PR-1422 had the best all-around fuel and high temperature properties. PR-1422 was selected as the material most suitable to replace EC-1373 as a general purpose sealant, and EC-1610 as the most suitable material for use as a faying surface sealant. (Author)

AD-286 237 Div. 14
(TISTM/ODN) OTS price $1.60

General Dynamics/Fort Worth, Tex.
MATERIAL - THIOKOL ST RUBBER - PREFABRICATED FILLETS - FOR INTEGRAL FUEL TANK SEALING - TESTING OF,
by H. C. Hoffman. 27 June 62, 14p. incl. illus. tables (Rept. no. FGT-1468)
(Contracts AF 33(038)21250 and AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Synthetic rubber, *Fuel seals, Airplanes, Fuel tanks, Density, Hardness, Tensile properties, Elasticity, Corrosion, Fluid flow, Specifications, Physical properties, Tests, Sea water.

All testing was done using prefabricated Thiokol 'ST' fillets. The tests were run in accordance with the procedures of Convair Specification FMS-0034 which included tests for specific gravity, linear thermal change, peel strength, flexibility, hardness, tensile strength and elongation, fluid resistance, corrosive action, and thermal flow. Each of the above listed properties was obtained on Immel prefabricated fillets and is believed to be representative of what may be expected of Thiokol 'ST' fillets. Based on the results of these tests, values have been recommended for a proposed new procurement specification. (Author)

AD-286 240 Div. 14
(TISTM/ODN) OTS price $1.60

General Dynamics/Fort Worth, Tex.
HYDRAULIC SYSTEM - ROYAL LUBRICANT FLUID, PARTIAL EVALUATION TEST.
2 July 62, 13p. incl. illus. tables (Rept. no. FTDM 2812)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Hydraulic fluids, *Hydraulic systems, *Airplanes, Specifications, Viscosity, Density, Stability, Oxidation, Corrosion, Physical properties, Tests, Test methods.

Some critical properties of Royco 846 hydraulic fluid were compared with those of Oronite 8515 hydraulic fluid to determine the suitability of the Royal fluid for use in the B-58 airplane. The mixed fluids sample (100 ml Royco + 200 ml Oronite) was included in the test to investigate properties of the mixture and mutual compatibility of the fluids. Results indicate that the fluids compare favorably and pass specification requirements for all properties tested with the exception of compatibility with Q2825 O-rings. This batch of Royco 846 had a more deleterious effect on the properties of Q2825 O-rings than did Oronite 8515, all O-ring properties tested being degraded after immersion in Royco 846. (Author)

AD-286 261 Div. 14
(TISTM/ODN) OTS price $1.10

General Electric Co., Evendale, Ohio.
HIGH STRENGTH GLASS FIBERS DEVELOPMENT PROGRAM.
Bimonthly progress rept. no. 1 for 20 July 62, by D. L. Hollinger and H. T. Plant. 20 July 62, 7p. incl. illus. table.
(Contract NOw 61-0641-c)
Unclassified report

DESCRIPTORS: *Glass textiles, *Filament-wound construction, *Fibers, Tensile properties, Rings, Epoxy resins, Reinforcing materials, Humidity, Tests, Mechanical properties.

Reduction of the humidity to a dew point of -45 F in the atmosphere surrounding E-glass fibers as they were drawn produced no consistent improvement in the glass stress calculated from split ring tensile tests of reinforced epoxy rings made from the monofilament. It is suspected that other factors including storage and testing conditions for the rings may be of over-riding importance in determining strength, particularly where such a small cross-section with one machined surface is involved. Daily fiber and test ring production rate was increased by the installation of automatic, time-actuated controls on the furnace heating circuits. Preparations are being made to test individual filament tensile strength for comparison with the calculated strength obtained in filament wound composite rings. (Author)

AD-286 262 Div. 14, 32
(TISTM/ODN) OTS price $1.60

Forest Products Lab., Madison, Wis.
LIST OF PUBLICATIONS ON STRUCTURAL SANDWICH, PLASTIC LAMINATES, AND WOOD-BASE AIRCRAFT COMPONENTS.
June 62, 14p. (Rept. no. RPI-4)
Unclassified report

DESCRIPTORS: *Reports, *Indexes, *Laminates, *Wood, *Bibliography, Aircraft, Materials, Mechanical properties, Physical properties, Bolts, Sandwich construction, Plastics, Joints, Resins, Paper, Lignin, Adhesives, Pathology, Biology, Wood pulp.

AD-286 264 Div. 14, 26
(TISTM/TCG) OTS price $1.60

Forest Products Lab., Madison, Wis.
THE MANUFACTURE OF VENEER.
Rev. June 62, 11p. incl. illus. (Rept. no. 285)
Unclassified report

DESCRIPTORS: *Wood, *Plywood, *Fiberboard, *Manufacturing methods, Sawmills, Cutting tools, Drying ovens.

Veneer and the methods commonly used to cut and dry it are described. The veneer industry and its products are also briefly discussed. (Author)

AD-286 279 Div. 14
(TISTM/TCG) OTS price $2.60

Midwest Research Inst., Kansas City, Mo.
SYNTHESIS OF ELASTOMERS CONTAINING Si-N BONDS IN THE MAIN CHAIN.
Quarterly rept. no. 4, 1 July-30 Sep 62, by L. W. Breed and R. L. Elliott. 30 Sep 62, 22p. incl. illus. tables, 25 refs.
(Contract DA 23-072-ORD-1687, Proj. 593-32-002)
Unclassified report

DESCRIPTORS: *Elastomers, *Silanes, *Polymers, *Nitrogen compounds, Chemical reactions, Amines, Methyl radicals, Monocyclic compounds, Silicon compounds, Viscosity, Synthesis.

The preparation of a group of polymers by the reaction of cyclic or linear silazane compounds with diols is reported. A number of these polymers had intrinsic viscosities in toluene greater than 0.3, and many were rubbery gums. No significant quantity of polymer has been found in decomposition products of diaminodiorganosilanes. Attempts to prepare the monomer, N-trimethylsilyl-N',N''-bis(chlorodimethylsilyl)hexamethylcyclotrisilazane were unsuccessful; however, a method satisfactory for the preparation of the intermediate, N-trimethylsilylhexamethylcyclotrisilazane was found. (Author)

AD-286 303 Div. 14, 4
(TISTM/TCG) OTS price $6.60

New York U. Coll. of Engineering, N. Y.
DEVELOPMENT OF IMPROVED TITANIUM ORGANIC COMPOUNDS FOR USE AS HYDRAULIC FLUIDS.
Technical rept. no. 2, 16 May-15 Aug 62.
15 Sep 62, 64p. incl. tables.
(Contract NOw 62-0647-d)
Unclassified report

DESCRIPTORS: *Hydraulic fluids, *Titanium compounds, *Titanates, *Metalorganic compounds, Complex compounds, Chlorides, Propyl radicals, Alkyl radicals, Phosphoric acids, Catalysts, Viscosity, Fluids, Zinc compounds, Stability.

The fluid developed by this group was evaluated and good high temperature properties and excellent sheer stability have been established. The material was pourable at -70 F., but was solid when stored undisturbed at -40 F. The work continues with two main approaches: one, using a reaction of tetra alkyl titanate with basic zinc octoate with titanium tetrachloride as catalyst; the other, reacting the two components in the presence of water, to more easily free the isopropyl groups of a tetra isopropyl titanate. Both products have a flame point around 600 F. The reaction between tetra alkyl titanates with organics containing phosphoric groups is being studied in an effort to introduce phosphoric groups in the titanates; it is

hoped that self flame extinguishing properties may be obtained beyond the present flame point. A reaction product between tetra isopropyl titanate and a tri octyl phosphate is studied as a viscosity reducing additive to the fluid complexes. (Author)

AD-286 329 Div. 14
(TISTM/EJH) OTS price $9.10

General Dynamics/Fort Worth, Tex.
MATERIAL - GLASS CLOTH REINFORCED PLASTICS - ROOM AND ELEVATED TEMPERATURE - PROPERTIES OF, by S. V. Glorioso. 1 May 59, 105p. incl. illus. tables (Rept. no. FGT-2186, pt. 1)
(Contracts AF 33(600)32841 and AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Composite materials, *Glass textiles, *Plastics, *Laminates, Resins, Epoxy resins, Reinforcing materials, Tensile properties, High temperature research, Temperature, Design, Test methods, Mechanical properties.

The results of this investigation consist of empirical data to be used in establishing design allowables at room and elevated temperatures for all combinations of the following glass fabrics and resins: Types 181, 143, 120, and 183 glass cloths with Class II (Laminac 4232), Class III (Conolon 506), and Class IV (Epon 828) type resins. Conclusions are: The values for Poisson's ratio decrease with temperature for laminates made with 181 and 143 cloths. Laminates made with 181 cloth have tensile strengths which are approximately equal at 0 and 90 degrees to the warp direction and approximately twice the strength of the material at 45 degrees to the warp direction. Exposures for 100 hours at 300 F at loads of 20 and 40% of room temperature bearing strength have no effect on the bearing properties at 300 F for the following glass cloth and resin combinations: 181 cloth with Class II resin, 181 cloth with Class III resin, and 143 cloth with Class II resin. Similar bearing loads at 300 F on laminates of 181 cloth with Class IV resin may cause failure before 100 hours of soak time is reached. (Author)

AD-286 330 Div. 14
(TISTM/ODN) OTS price $1.60

General Dynamics/Fort Worth, Tex.
SUMMARY OF QUALIFICATION TEST DATA, GLASS REINFORCED PLASTIC MATERIAL PER FMS-0031, by S. F. Monroe. 15 June 62, 12p. incl. tables. (Rept. no. FZM-2686)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Reinforcing materials, *Plastics, *Glass, Laminated glass, Manufacturing methods, Resins, Esters, Polymers, Epoxy resins, Phenolic resins, Tensile properties, Elasticity, Electrical properties, Data, Mechanical properties.

A summary is given of the qualification test data of glass reinforced plastic materials to the requirements of FMS-0031. Polyester, epoxy and phenolic laminating materials were tested. The FZM is divided into the following 4 sections: I. Physical testing of prepregs. II. Fabrication of Test Panels. III. Qualification Requirements. IV. Typical Mechanical Properties of Commercially Available Materials Tested for Qualification to the Requirements of FMS-0031. (Author)

AD-286 331 Div. 14, 1
(TISTM/EJH) OTS price $8.10

General Dynamics/Fort Worth, Tex.
MATERIAL - ADHESIVE - FMS-0057 - OVERLAP SHEAR STRENGTH OF - EFFECTS OF PROCESS VARIABLE ON, by R. L. Miller and J. E. Thomas. 1 July 58, 74p. incl. illus. tables (Rept. no. FGT-1937)
(Contracts AF 33(600)32841 and AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Adhesives, *Airframes, *Bonded joints, Aluminum alloys, Bonding, Processing, Aging, Shear stresses, Failure (Mechanics), Laminates, Temperature, Pressure, Tables.

The effect of certain process variables on the overlap shear strength of FMS-0057 adhesive (AF-31) bonded specimens was determined. When tested at -67, 75, and 260 F the lap shear strength of AF-31 bonded 2024T-3 alclad aluminum in general increases as the bonding pressure is increased for specimens with bonded overlap size up to 5.0 inches. The highest strengths were obtained at 150 psi bonding pressure and the lowest at 25 psi bonding pressure. When bonded to 2024T-3 alclad aluminum at 45, 100, 150 and 200 psi the shear strength of AF-31 adhesive at all test temperatures generally decreases as the bonded overlap size is increased. The results obtained from specimens bonded at 25 psi were erratic and showed no trend as regards bonded overlap size. When bonded with AF-31 adhesive at 45 psi and tested at -67 and 260 F, lap shear specimens of 2024T-86 alclad, 2024T-86 unclad, 7075T-6 alclad and 7075T-6 unclad aluminum compare favorably with results from similar specimens of 2024T-3 alclad bonded and tested under the same conditions. (Author)

AD-286 392 Div. 14, 27
(TISTM/MSH) OTS price $3.60

Atlantic Research Corp., Alexandria, Va.
DEVELOPMENT OF FLEXIBLE POLYMERS AS THERMAL INSULATION IN SOLID-PROPELLANT ROCKET MOTORS. Quarterly progress rept., 1 July-30 Sep 62, by T. R. Walton and E. B. Simmons. Oct 62, 27p. incl. illus. tables, 4 refs.
(Contract DA 36-034-ORD-3325)
Unclassified report

DESCRIPTORS: *Resins, *Thermal insulation, *Combustion chamber liners, *Heat resistant polymers, *Rocket motors, Elasticity, Expanded plastics, Mechanical properties, Rocket motors, Solid rocket propellants, Epoxy resins, Phenolic resins, Formaldehyde, Furan resins, Castor oil, Asbestos fibers, Polymers, Additives.

Flexible materials were obtained by copolymerization of furan prepolymers and epoxy resins or diisocyanates. Mechanical properties were determined for 40% castor oil-modified Guardian filled with 40% of asbestos fibers and 1:1 phenol-formaldehyde:Syl Kem 90 resin, filled with 45% of asbestos fibers. The ultimate elongations were 6 and 0.4%, respectively. Four static-motor firings were made. A char rate of 1.7 mil/sec was obtained for an Epon 828:tetrahydrophthalic anhydride:castor oil formulation filled with 40% of asbestos fiber. The 40% castor oil-modified Guardian filled with 20% of asbestos fibers and 20% of potassium oxalate had a char rate of 2.4 mil/sec and showed a slight improvement over the material filled only with 40% of asbestos fiber. The castor oil-modified Guardian filled with 40% of silica-microballoons had a char rate of 5.0 mil/sec, but a very low density, 0.71 g/cc. The densities of the 40% asbestos and oxalate filled materials are about 1.45 g/cc. (Author)

AD-286 464 Div. 14, 4
(TISTM/EJH) OTS price $4.60

Aerojet-General Corp., Azusa, Calif.
RESEARCH AND DEVELOPMENT OF HIGH-TEMPERATURE-STABLE INORGANIC RESINS AND ELASTOMERS.
Final rept., 1 July 61-21 June 62,
by J. Feltzin. Aug 62, 45p. incl. tables, 3 refs. (Rept. no. 2365)
(Contract DA 04-495-ORD-3075)
Unclassified report

DESCRIPTORS: *Heat resistant polymers, *Polymers, *Silicon compounds, Resins, Silicates, Asbestos fiber, Mica, Decomposition, Solutions, Silanes, Halides, Methyl radicals, Chlorides, Elastomers, Phenyl radicals, Inorganic substances, Molecular weight, Stability, Mechanical properties, Polymerization, Copolymerization, Synthesis.

The preparation of thermally stable, flexible and elastic silicates was investigated. The study included attempts to modify the natural silicates, asbestos and mica, and the synthesis of silicate polymers from simpler starting materials. Several methods for the extraction of metal ions from the matrix of asbestos and mica were investigated. X-ray data show that asbestos was at least partially degraded by the sublimation treatment with NaCl. Complete solubilization of asbestos in dilute HCl was achieved. Reactions of partially degraded asbestos were accomplished with B and Zr compounds, resulting in the introduction of these elements into the silicate matrix. Modification of the polymer derived from the reaction of a silicate with an organohalosilane was investigated. The object of the investigation was to increase the molecular weight of the polymer and to incorporate phenyl groups into the polymer structure. Increases in molecular weight were achieved by the use of methyltrichlorosilane and methylvinyldichlorosilane as crosslinking agents; preliminary evaluation of higher molecular wt samples did not indicate any unusunl improvement of properties. (Author)

AD-286 490 Div. 14, 29, 26
(TISTM/EJH) OTS price $7.60

Little, Arthur D., Inc., Cambridge, Mass.
COLD-WATER-SOLUBLE HONEYCOMB FACING ADHESIVE FOR FIELD USE.
Rept. no. 4 (Final),
by R. S. Lindstrom and J. J. Krackeler. 7 Sep 62, 72p. incl. illus. tables (Rept. no. C-64020)
(Contract DA 19-129-qm-1885)
Unclassified report

DESCRIPTORS: *Adhesives, *Honeycomb cores, *Air drop operations, *Packaging, Bonding, Paper, Solubility, Water, Storage, Physical properties, Military requirements, Viscosity, Materials, Buoyant materials, Starches.

AD-286 502 Div. 14, 25
(TISTM/TCG) OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
THERMODYNAMIC PROPERTIES OF POLYMETHYL METHACRYLATE AND METHYL METHACRYLATE,
by R. W. Warfield and M. C. Petree. Aug 62, 11p. incl. illus. tables (Rept. no. NOLTR 62-98)
Unclassified report

DESCRIPTORS: *Polymers, *Acrylic resins, *Thermodynamics, *Plastics, Methyl radicals, Specific heat, Enthalpy, Energy.

Lack of information on the fundamental thermodynamic properties of polymethyl methacrylate and methyl methacrylate prompted a study of the available thermodynamic parameters of these materials. From published data the entropy, enthalpy, and Gibbs free energy values of polymethyl methacrylate were calculated over the temperature range 0 to 260 K. The thermodynamic function, Cp/sub T vs T, has been calculated and exhibits a maximum value between 70 and 100 K. An approximation is made of the number of vibrating units per repeating unit of polymethyl methacrylate at 260 K. The difference Cp -C sub v calculated at 260 K and found to be 0.014 cal/deg gm. It is recommended that additional low temperature specific heat measurements be made on polymers and monomers. (Author)

AD-286 561 Div. 14
(TISTM/ODN) OTS price $1.60

Vermont U., Burlington,
REGULAR PREPREG, WIDE BAND PREPREG AND ORDINARY WET WOUND PRESSURE VESSEL STRENGTHS COMPARED AND THE EFFECTS OF PROOF TESTING ON VESSEL STRENGTHS,
by John O. Outwater and Willard J. Seibert.
15 Oct 62, 10p. incl. illus. tables (Technical memo. no. 195)
(Contract Nonr-321901, Proj. 62-R05 19A)
Unclassified report

DESCRIPTORS: *Pressure vessels, *Filament wound construction, *Laminates, Tests, Loading, Moisture, Pressure, Resins, Mechanical properties.

A series of laminated pressure vessels was wound with regular prepreg, wide band prepreg and with wet roving. The results indicate no significant increase of strength of wide band over ordinary prepreg though the vessels made with wet winding indicated a significant increase in strength in 2 rolls out of the 3 used. The effects of holding the preload pressure at 80% of burst for a minute significantly reduces the strength compared to merely giving the vessel an instantaneous preload of 80%. (Author)

AD-286 575 Div. 14, 4
(TISTM/ODN) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CHEMISTRY AND TECHNOLOGY OF FUELS AND LUBRICANTS (SELECTED ARTICLES).
5 Oct 62, 17p. incl. illus. tables, 17 refs.
(Trans. no. FTD-TT-62-1024 from Khimiya I Tekhnologiya Topliv I Masel, 12: pp. 7-11, 39-43, 1961)
Unclassified report

DESCRIPTORS: *Lubrication, *Oils, *Synthesis, *Additives, *Corrosion, Esters, Naphthyl radicals, Phenyl radicals, Phenoxy radicals, Methyl radicals, Benzyl radicals, Ethyl radicals, Stearates, Stearic acids, Abrasion, Copper, Radiology, USSR, Physical properties, Bibliography, Sulfur compounds, Steel, Chlorine compounds.

A method for preparing phenyl, p-xylyl, o-xylyl, naphthyl, and phenoxyphenylstearic acids was developed. Methyl, 2-ethylhexyl, and benzyl phenylstearate; methyl and benzyl, p-xylyl- and o-xylylstearate; methyl and benzyl naphthylstearate; and benzyl phenoxyphenylstearate were prepared and their properties examined. The addition of anti-abrasive additives to DC-14 sharply increased wear on friction surfaces. The use of these additives in composition with triphenyl phosphite insures that the level of wear on the surfaces of friction will be equal to the level of the wear which takes place when operating on oil without additives. It was experimentally proven that the use of P compounds as anti-corrosive components in composition with anti-abrasive additives not only

sharply reduces corrosion, but also provides a decrease in chemical wear on the surfaces of friction with low stresses. (Author)

AD-286 642 Div. 14, 25
(TISTM/SJR) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
ULTRA-PRESSURE HIGH TEMPERATURE RESEARCH: A FRONTIER IN THE QUEST FOR NEW ELECTRONIC MATERIALS,
by A. A. Giardini and J. A. Kohn. 1962, 13p. incl. illus. table, 12 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Synthetic gems, *Inorganic substances, *Diamonds, Industrial diamonds, Crystals, Single crystals, Growth, Semiconductors, Electronics, High pressure research, High temperature research, Boron compounds, Nitrides, Garnet, Cobalt compounds, Carbides, Iron compounds, Graphite, Gallium compounds, Arsenides, Silver compounds, Halides, Manganese compounds, Synthesis.

Research devices sustaining pressures of over 1,500,000 psi over 2500 C have been constructed. Diamond has been repeatedly synthesized, its growth mechanism deciphered, and the synthesis of pure, electronic-grade crystals demonstrated. Cubic boron nitride, a more inert, terrestrially unknown, diamond analogue also has been prepared. Several new crystalline materials, obtained as by-products of the diamond, and boron nitride studies, are described and their significance discussed. The pressure-transmitting solid, pyrophyllite, has been altered to the minerals kyanite and coesite, a finding of geophysical significance. Pressure-dependent data are presented on gallium arsenide (resistivity) and silver halides (ionic conductivity). The latter, as solid ionic cells, form practical pressure measuring devices. (Author)

AD-286 702 Div. 14, 17
(TISTM/EJH) OTS price $2.60

General Dynamics/Convair, San Diego, Calif.
CHROMATE LEACHING UNDER ACCELERATED WEATHERING CONDITIONS ON MATERIALS - COATINGS AND FINISHES - ORGANIC - PRIMERS, CORROSION INHIBITING - LACQUER AND EPOXY RESIN VEHICLE - ZINC CHROMATE PIGMENT,
by M. A. McGowan, N. Nalley, and W. M. Sutherland. 15 May 61, 1v. incl. illus. tables. (Rept. no. 8926-029)
(Contract AF 33(600)36546)
Unclassified report

DESCRIPTORS: *Pigments, *Paints, *Plastic paints, *Paint primers, *Aluminum, Chromates, Zinc compounds, Calcium compounds, Epoxy resins, Varnishes, Labeled substances, Enamel coatings, Test methods, Humidity, Seawater, Climatic factors, Corrosion inhibition.

The preparation of Chromium 51 tagged zinc chromate pigment in accordance with Mil-P-8585 for use in lacquer vehicle primer, and a proprietary calcium chromate pigment for use in epoxy resin vehicle primer is described along with the preparation of the corrosion inhibiting primers used. Radioactive counts were used to determine chromate losses, and weight differences were used to determine primer losses resulting from humidity cabinet and salt spray cabinet exposures. Chromate loss from aluminum surfaces took place at a slow rate. During the first week in the humidity cabinet about 0.7% of the chromate ion left the surface per day and from the 6th through the 7th week, the rate of loss was almost constant at 0.1% per day. (Author)

AD-286 704 Div. 14
(TISTM/ODN) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
TENSILE SHEAR AND PEEL STRENGTH TESTS OF BONDED TEFLON SLIDE BLOCKS FOR SUPERSONIC SEAT,
by J. F. Holdener and W. M. Sutherland. 29 June 61, 5p. incl. illus. table (Rept. no. 8926-028)
(Contract AF 33(600)36546)
Unclassified report

DESCRIPTORS: *Adhesives, *Polymers, *Stainless steel, Mechanical properties, Ethylenes, Fluorides, Alloys, Tensile properties, Humidity, Aging, Epoxy resins, Shear stresses, Coatings, Rubber, Tests, Cadmium plating, Bonding.

The tensile shear and peel strength of passivated Type 410 stainless steel to caustic etched Teflon to Cd plated 4130 alloy steel composite joints bonded with various adhesives which were cured under various drying conditions was determined both before and after humidity test exposure. As a result of these tests the Ray Bond R-86004, a 2 component epoxy adhesive, and EC-1751/EC-1752, a two component epoxy adhesive, were shown capable of producing high bond strengths throughout the variety of curing and humidity conditions considered. The Eastman No. 910, a proprietary adhesive, Bondmaster M648T, a 2 component epoxy adhesive, EC-1300, a neoprene rubber cement, and Narmco 3119, a 2 component epoxy adhesive, were eliminated because of inadequate tensile shear and peel strength. Continued tensile shear and peel testing with 2024-T4 Alodine 600 coated to Teflon to 2024-T4 Alodine 600 coated composite joints showed the superiority of EC 1751/EC-1752 over the Ray Bond R 86004 adhesive throughout the variety of curing and humidity conditions studied. Shear strengths ranging from 158 to 218 psi and 35 to 65 p/i of width were found with the EC-1751/EC-1752 bonded joints. (Author)

AD-286 721 Div. 14, 29, 3, 10
(TISTM/SRJ) OTS price $2.60

Naval Supply Research and Development Facility, Bayonne, N. J.
DEVELOPMENT AND EVALUATION OF CHEMICALLY RESISTANT BUTYL BLENDED COATED FABRICS,
by A. M. Siegfried. Dec 61, 26p. incl. tables, 19 refs. (Clothing and Textile Div. rept. no. 62)
Unclassified report

DESCRIPTORS: *Protective clothing, *Liquid rocket propellants, *Chemical warfare agents, Mustard gas, G agents, Nitric acid, Hydrogen compounds, Peroxides, Hydrazines, Decaboranes, Cotton textiles, Butyl rubber, Coatings, Polymers, Rubber coatings, Mechanical properties, Tests, Materials.

Two chemically resistant coating formulation for protective clothing applications were developed in which the major constituents were butyl rubber blended with polyethylene in two different molecular weights. These were utilized on an experimental basis to prepare double coated airplane fabrics designed to provide improved resistance to permeation and degradation by toxicological (CW) agents and liquid rocket propellant ch micals (acids and fuels). Physical and chemical evaluations were conducted on these experimental fabrics and on the three available chemically resistant butyl coated fabrics which

were used for comparative study. Formulations, processing data, physical and chemical properties are given for the materials and their relative merits discussed on the basis of military standards. (Author)

AD-286 777 Div. 14, 26
(TISTM/TCG) OTS price $2.60

General Dynamics/Convair, San Diego, Calif.
EFFECT OF COMPOSITION AND PROCESSING VARIABLES ON MECHANICAL AND THERMAL PROPERTIES ON MATERIAL - GRAPHITE - RESIN BONDED WITH METALLIC OR NON-METALLIC INORGANIC ADDITIONS,
by J. E. Shoffner, H. C. Turner and W. M. Sutherland. 3 Mar 62, 20p. incl. illus. tables, 5 refs. (Rept. no. 8926-011)
(Contract AF 33(600)36546)
Unclassified report

DESCRIPTORS: *Graphite, *Phenolic resins, *Inorganic substances, Silicon compounds, Carbides, Copper, Aluminum compounds, Oxides, Reinforcing materials, Molding materials, Processing, Thermal diffusion, Thermal stresses, Honeycomb cores, Sheets, Steel, Brazing, Bonding.

Flake graphite, SiC, Cu and kyanite were added to Rez-Coat (RF-192) ultra-high-temperature phenolic resin compound used for fabric reinforcement to develop a molding compound for tooling for brazing steel honeycomb panels. Various processing variables were investigated and the feasibility of products with adequate strength, thermal stability and thermal diffusivity for honeycomb brazing tooling was demonstrated. (Author)

AD-286 778 Div. 14, 8
(TISTM/TCG) OTS price $2.60

General Dynamics/Convair, San Diego, Calif.
MECHANICAL AND PHYSICAL PROPERTIES ON MATERIALS - FIBERGLAS LAMINATE - FILAMENT WOUND FOR RADOMES,
by P. R. Macy, W. M. Parker and H. C. Turner. 23 June 59, 18p. incl. illus. table (Rept. no. 8926-015)
(Contract AF 33(600)30169)
Unclassified report

DESCRIPTORS: *Glass textiles, *Laminates, *Filament wound construction, *Radomes, Wire winding machines, Binders, Polymers, Esters, Resins, Shear stresses, Tensile properties, Elasticity, Physical properties, Mechanical properties.

Physical and mechanical tests were made with material taken from 9 inches inside diameter, 17 inches long, 0.310 inch wall thickness filament-wound fiberglas cylinders. Each cylinder consisted of seven laminations: four were in the longitudinal direction and were about 0.036-inch thick, and three were circumferential and about 0.060 inch thick. Filament winding was done with 60 end fiberglas roving stock and the binder used was Vibrin 135 TAC polyester resin. The properties determined were as follows: tension, compression, shear, flexural, and bearing strengths; specific gravity; resin content; and water absorption. (Author)

AD-286 839 Div. 14, 17
(TISTM/ODN) OTS price $1.10

General Dynamics/Fort Worth, Tex.
MATERIAL 5% CHROME TOOL STEEL ETCHANT - DEVELOPMENT OF.
Test data memo.,
by J. L. Cozart. 11 Dec 58, 3p. incl. table
(Rept. no. FTDM-2135)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Tool steel, *Steel, Alloys, Chromium alloys, Photoengraving, Solutions, Acids, Hydrogen, Sulfuric acid, Nitric acid, Phosphoric acids, Hydrochloric acid.

A suitable acid etchant was developed for 5% chrome tool steels. A second suitable etchant was obtained from another source. Formulations of the 2 etchants and their results on annealed and heat treated Potomac M and Vascojet 1000 tool steels are presented. Various etchant formulations which were investigated but found unsuitable for use are also included. (Author)

AD-286 841 Div. 14, 17
(TISTM/ODN) OTS price $1.10

General Dynamics/Fort Worth, Tex.
WING - DYNAMIC ETCHED CORRUGATED SPAR WEBS - FATIGUE TENSILE - TEST OF.
Report on Process - Electroless Nickel - Thickness Requirements for Hardness Testing - Determination of,
by J. May. 9 July 58, 7p. incl. illus. tables
(Rept. no. FTDM-1949)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Wings, *Aluminum, Manufacturing methods, Mechanical properties, Tensile properties, Fatigue (Mechanics), Elasticity, Tests, Materials.

AD-286 892 Div. 14
(TISTM/TCG) OTS price $2.25

National Bureau of Standards, Washington, D. C.
PROPERTIES OF GLASSES AT ELEVATED TEMPERATURES.
Interim rept. Jan-Dec 61 on Materials Application,
by Matthew J. Kerper, T. G. Scuderi and E. H. Eimer. Aug 62, 89p. incl. illus. tables, 10 refs.
(Contract AF 33(616)59-4, Proj. 7381)
(WADC TR 56-645, pt. 6)
Unclassified report

DESCRIPTORS: *Glass, *High temperature research, *Heat resistant glass, Stresses, Fracture (Mechanics), Creep, Failure (Mechanics), Windshields, Military equipment, Vehicles, Physical properties.

In order to establish realistic design criteria applicable to selected oxide glasses having utility as viewing windows in Air Force vehicles, certain physical properties were determined throughout the useful temperature range of the glasses. Data is presented on several glasses at the top temperature at which short time modulus of rupture testing can be conducted. The stress rupture results for all seven glasses in the program are presented. Creep results obtained on Pittsburgh Plate Glass 6695 are also given. Equations were developed to represent the relationship of the mirror radius on the fracture surface to the modulus of rupture data. An analysis of the distribution of strength values of glass was made. The data shows essentially that glass does fit normal theory with certain reservations. A description of the apparatus used for determining the relationship between strength and size together with some preliminary findings regarding this relationship are presented. (Author)

AD-286 893 Div. 14
(TISTM/ODN) OTS price $2.25

National Bureau of Standards, Washington, D. C.
PROPERTIES OF GLASSES AT ELEVATED TEMPERATURES.
Interim rept. Jan 56-Dec 61 on Materials

Application,
by Matthew J. Kerper. Aug 62, 80p. incl. illus. tables, 14 refs.
(Contract AF 33(616)59-4, Proj. 7381)
(WADC TR 56-645, pt. 7)
Unclassified report

DESCRIPTORS: *Heat resistant glass, *High temperature research, Heat treatment, Glass, Mechanical properties, Rupture, Stresses, Creep, Windshields, Sandblasting, Boron compounds, Silicates, Aluminum compounds, Oxides, Elasticity, Fracture (Mechanics), Tests, Processing, Abrasion, Silicon compounds, Dioxides.

The ASD program to obtain useful, statistically sound, design criteria on optically transparent window materials of a brittle nature and suitable for military air vehicle applications is summarized. Several factors associated with the determination of Young's modulus and the modulus of rupture for seven commercially available glasses are presented and interpreted. The practical strength of plate glass is dependent on several factors including surface finish, thermal conditioning, cutting techniques and composition. Effects of these variables together with long and short time elevated temperature strength capabilities are shown. (Author)

AD-286 894 Div. 14
(TISTM/TCG) OTS price $1.60

Narmco Industries, Inc., San Diego, Calif.
POTENTIAL OF FILAMENT WOUND COMPOSITES.
Monthly progress rept. no. 17, 1-30 Sep 62,
by D. Stevens and W. Otto. 30 Sep 62, 15p. incl. illus. tables.
(Contract NOw 61-0623-c)
Unclassified report

DESCRIPTORS: *Glass textiles, *Composite materials, *Filament wound construction, Stresses, Tensile properties, Photoelasticity, Failure (Mechanics), Humidity, Scheduling, Tests, Hydraulic systems, Test equipment, Resins, Heating.

The effect of tension during cure on the strength of glass roving and the effect of humidity cycling on the strength of single uncoated E-glass fibers is reported. A description is presented of the apparatus used for photoelastic evaluation of biaxial stress in specially prepared Maltese cross test specimens. A failure sequence for one of these specimens is shown. (Author)

15. MATHEMATICS

AD-285 622 Div. 15
(TISTP/WH) OTS price $9.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
A BUILDING BLOCK TECHNIQUE FOR THE STATEMENT AND SOLUTION OF PROBLEMS INVOLVING THE BIVARIATE NORMAL DISTRIBUTION.
Master's thesis,
by Arthur Glen Builta. Aug 62, 102p. incl. illus. tables (Rept. no. GA/EE/62-1)
Unclassified report

DESCRIPTORS: *Statistical distributions, *Analytical geometry, *Integrals, *Analysis of variance, *Numerical methods and procedures.

The Building Block Technique is a simplified method for solving problems involving two normal (Gaussian) statistical variables. This technique is intended for engineers who are not versed in statistics. Graphs and tables of precomputed statistical functions, and a catalog of these functions in the form of geometrical analogs (building blocks) are presented. The paper is self-contained: if the problem is stated using the building blocks, the answer is the algebraic sum of their values. A new function, A(B,gamma), the probability included in an offset angle of the unit circular normal distribution, is introduced and tabulated to five decimal places. (Author)

AD-285 643 Div. 15
(TISTP/GRW) OTS price $7.60

Mathematics Research Center, U. of Wisconsin, Madison.
A SOLUTION OF THE SHANNON SWITCHING GAME,
by Alfred Lehman. July 62, 77p. incl. illus. 13 refs. (MRC Technical summary rept. no. 308)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Games theory, Scheduling.

Two players, designated cut and short, are presented with a finite linear graph in which two of the vertices are distinguished. The cut player in his turn deletes one of the branches of the graph, his object being to sever all paths between the two distinguished vertices. The short player alternates plays with the cut player. In his turn he makes an unplayed branch involnerable to deletion, his object being to connect the two distinguished vertices by an involnerable path. The game proceeds until one of the players reaches his goal. It is shown that the short player, playing second, can win against all possible strategies of the cut player if and only if the graph contains two disjoint cospanning trees which connect the two distinguished vertices. A strategy is given in which any play by the cut player on one tree is countered by a play by the short player on the remaining tree. While this strategy need not win in a minimum number of plays, it enables the short player to win where possible, without knowledge of the chosen vertex pair. By duality a characterization is found for those graphs with two distinguished vertices in which the cut player, playing second, can win against all possible strategies of the short player. The remaining graphs are those on which the player playing first can win against all strategies of the other player. These results also hold for the corresponding game played on matroids. (Author)

AD-285 644 Div. 15
(TISTP/MS) OTS price $2.60

Mathematics Research Center, U. of Wisconsin, Madison.
INERTIA THEOREMS FOR MATRICES. THE SEMI-DEFINITE CASE,
by David Carlson and Hans Schneider. July 62, 26p. incl. illus. 11 refs. (MRC Technical summary rept. no. 342)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Matrix algebra, Transformations (Mathematics), Inequalities.

Generalizations and applications of the Main Inertia Theorem for Matrices (Ostrowski-Schneider, J. Math. Anal. & Appl. 4, 72-84, (1962), O. Taussky, J. Soc. Ind. & Appl. Math 9, 640-643, (1961)) are discussed in the case $(AH) \geq 0$. In

two special cases the relation between In H and In A is determined. It is shown that for all A there exists a non-singular Hermitian H such that $R(AH) \geq 0$ and a necessary and sufficient condition is given for the existence of $H \geq 0$ for which $R(AH) \geq 0$. For a given subspace N, conditions are found for the existence of a Hermitian K such that $R(AK) \geq 0$ and $N = N(K) = N(R(AK))$. (Here $N(K)$ is the null-space of K.) If such a K exists, further conditions are found under which $N(H) = N$ for all Hermitian H with $R(AH) \geq 0$ and $N(R(AH)) = N$. Finally, an effective test is given for the H-stability of a matrix A. (Author)

AD-285 661 Div. 15, 14
(TISTM/ODN) OTS price $2.60

Mathematics Research Center, U. of Wisconsin, Madison.
TRANSITION THEORY OF CREEP RUPTURE,
by B. R. Seth. July 62, 23p. incl. illus. 18 refs. (MRC Technical summary rept. no. 321)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Creep, *Mathematical analysis, Deformation, Theory, Bibliography, Rupture.

Two semi-empirical assumptions are made to treat problems of creep and relaxation. The first is a creep law. The second is a yield condition. The first arises due to the use of linear strain measures and the second due to the neglect of an intermediate state between elastic and plastic deformation. The use of non-linear generalized strain measures does away with the necessity of using the first. The identification of the transition state in elastic-plastic deformation with the turning points of the non-linear differential equations arising out of the equations of equilibrium shows that the second may not also be used. Thus we get a unified treatment of problems in creep and relaxation bereft of a number of unnecessary laws and yield conditions. The present treatment deals with only creep problems, but those relating to relaxation can be similarly dealt with. The case of a hollow tube subjected to internal pressure has been treated in detail and it is found that the creep stresses are exactly of the forms as obtained by Kachanov (Kachanov, L.M., Theory of Creep, Moscow, 1960, p. 455). (Author)

AD-285 662 Div. 15
(TISTP/MS) OTS price $5.60

Mathematics Research Center, U. of Wisconsin, Madison.
APPLICATIONS OF THE CALCULUS OF FACTORIAL ARRANGEMENTS I: BLOCK AND DIRECT PRODUCT DESIGNS,
by B. Kurkjian and M. Zelen. July 62, 56p. 14 refs. (MRC Technical summary rept. no. 330)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Calculus of variations, *Factor analysis, *Sequences, Matrix algebra.

An operational calculus for factorial arrangements is applied to the analysis of randomized block, balanced incomplete block, group divisible and many direct product designs. (The theoretical aspects of the calculus were presented Ann. Math. Stat. June 1962.)

AD-285 664 Div. 15
(TISTP/MS) OTS price $1.60

Mathematics Research Center, U. of Wisconsin, Madison.
PROPERTIES OF SOLUTIONS OF ABSTRACT DIFFERENTIAL INEQUALITIES,
by V. Lakshmikantham. July 62, 14p. 12 refs. (MRC Technical summary rept. no. 334)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Differential equations, *Inequalities, Functions, Theory.

Many properties concerning the behavior of solution of ordinary differential equations can be made to depend on a scalar differential equation. Comparison principle of this type has been widely used. Using similar approach, we consider some properties of solutions of abstract differential inequalities of the type $|x' - A(t)x - f(t,x)| \leq W_1(t, |x|)$ where $A(t)$ is a given function whose values are linear operators acting in a Banach Space. We obtain estimates of the norm of solutions, and also consider stability and boundedness results. A general uniqueness theorem for abstract differential equations is also included. (Author)

AD-285 696 Div. 15
(TISTB/AW) OTS price $2.60

System Development Corp., Santa Monica, Calif.
SOME QUEUING PROBLEMS WITH BALKING AND RENEGING - I,
by C. J. Ancker, Jr. and A. V. Gafarian. 14 Sep 62, 24p. incl. illus. 9 refs. (Rept. no. SP-372/001/01)
Unclassified report

DESCRIPTORS: *Sampling, *Probability, Statistical distributions, Special functions, Applied mathematics, Time lag theory, Operations research.

Balking (refusing to join the queue) and reneging (leaving the queue after entering) are considered. The model assumes: (1) Customers arrive from a single infinite source in a Poisson stream. (2) Arriving customers balk with probability n/N where n is the number in system and N is the maximum number allowed in the system. (3) Joining customers renege if service does not begin by a certain time which is a random variable with negative exponential distribution. (4) A single-service facility operates on a first-come, first-svrved basis with negative exponential service time distribution. For the steady state, the following are obtained: the state probabilities; mean number in queue and system; the probability of R or more in system; the probabilities of balking, waiting, reneging, and acquiring service; the customer loss rate; the distribution and mean value of time in queue for customers who acquire service; and the corresponding results for those who renege. All of these results are also obtained for a pure balking system (no reneging) by setting the reneging parameter equal to zero. This case may be interpreted as the simple machine interference problem for which some of the results appear to be new. (Author)

AD-285 779 Div. 15, 25
(TISTP/MS) OTS price $1.10

Brown U. Div. of Applied Mathematics, Providence, R. I.
ON UNIQUENESS IN LINEAR VISCOELASTICITY,
by E. T. Onat and S. Breuer. Sep 62, 7p. 5 refs. (Technical rept. no. C11-84)
(Contract Nonr-56210, Proj. NR-064-406)
Unclassified report

DESCRIPTORS: *Integral equations, *Elasticity, *Tensor analysis, Shear stresses, Deformation, Theory, Integral transforms.

An attempt was made to offer a new proof of Volterra's result. The proof follows closely the standard uniqueness proof in the classical

theory of elasticity and makes use of two well-known results in the theory of Laplace transforms. (Author)

AD-285 781 Div. 15
(TISTP/TL) OTS price $1.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
A METHOD FOR ESTIMATING THE EXPECTED VALUE OF A FUNCTION OF A RANDOM VARIABLE FROM GROUPED DATA,
by R. H. Peterson. May 62, 16p. (BRL memo. rept. no. 1408)
(Proj. 503-04-004)
Unclassified report

DESCRIPTORS: *Statistical functions, *Statistical distributions, *Fourier analysis, *Series, Groups (Mathematics), Statistical analysis, Real variables.

A method is presented for estimating the expected value of a function of a random variable from grouped data which uses only information available at the ends of the classes into which the data are grouped as opposed to the generally used 'class mark' method. Its advantages are illustrated by use in fitting a Fourier series to a set of grouped data. (Author)

AD-285 794 Div. 15
(TISTP/MS) OTS price $6.60

Air Force Cambridge Research Labs., Bedford, Mass.
FOURIER-TRANSFORM METHODS FOR PATTERN RECOGNITION,
by C. M. Jones, J. F. Kellaher and others.
July 62, 65p. incl. illus. tables, 7 refs.
(AFCRL 62-512) Unclassified report

DESCRIPTORS: *Reading machines, *Fourier analysis, Collecting methods, Statistical processes, Classification, Identification, Analysis.

The use of Fourier transform methods for classifying images is investigated in some detail. It is concluded that the amplitudes of frequency components of the waveform of a scanned image offer a useful description method. Topics include a discussion of the factors affecting classification, methods for representing patterns, comparison of relative complexities of the time and frequency representations, definition of well-constructed of interesting patterns, effects of varying scanning modes, separability of patterns represented by the power density spectrum, and design of a conceptual image classification system. (Author)

AD-286 057 Div. 15, 2
(TISTP/GRW) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
THE ERROR FIELD ASSOCIATED WITH INSTRUMENTATION FOR POSITION DETERMINATION,
by Th.-W. Schmidt. 1962, 11p. incl. illus. 12 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Position finding, Differential equations, Instrumentation, Mathematical prediction, Least squares method, Astronomy, Geodesics, Errors.

The error of position in the determination of a point in two or three dimensions was studied since the method of least squares was founded. Knowledge of the errors over an extended region is still today obtained through point wise calculation and interpolation, a process which is tedious and time consuming. A new approach is based on the concept of the error field determined by the ground instrumentation. Differential equations based on the method of measurement can be established and their solution allows a concise over-all description of the error characteristics of the measuring system. Examples of such error fields in the two dimensional case are given for different systems. (Author)

AD-286 093 Div. 15
(TISTP/FR) OTS price $1.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
ALGEBRAIC COMPUTER LEARNING PROGRAM,
by Beulah Rudner. 17 Jan 62, 12p. incl. illus.
(Research rept. no. PIBMRI 980-61; Scientific rept. no. 3)
(Contract AF 19(604)6154, Proj. 4691)
(AFCRL 62-565) Unclassified report

DESCRIPTORS: *Algebra, *Programming, Digital computers.

A computer program for learning how to solve various algebraic problems is described. The program was tried on 2 problems - solving a linear equation; finding an arithmetic mean. It succeeded in the first, but failed in the allotted time to solve the second. Detailed test results are presented and discussed. (Author)

AD-286 154 Div. 15
(TISTP/MS) OTS price $2.60

Cornell U. Sibley School of Mechanical Engineering, Ithaca, N. Y.
A RANDOM INTERVAL FILLING PROBLEM,
by P. E. Ney. 3 Aug 61, 25p. 5 refs. (Technical rept. no. 4)
(Contract Nonr-40143)
Unclassified report

DESCRIPTORS: *Real variables, *Statistical distributions, *Probability, Functions, Integral transforms.

AD-286 302 Div. 15
(TISTP/MS) OTS price $2.60

Naval Nuclear Ordnance Evaluation Unit, Albuquerque, N. Mex.
A METHOD FOR DETERMINING A CONFIDENCE BOUND ON UNRELIABILITY WHEN TIME-TO-FAILURE IS NORMALLY DISTRIBUTED,
by Vanamalai Seshadri and Patrick L. Odell.
31 Aug 59, 26p. incl. illus. tables, 5 refs.
(NAVORD rept. no. 6623)
Unclassified report

DESCRIPTORS: *Quality control, *Failure (Mechanics), *Statistical processes, *Statistical distribution, *Probability, Test methods.

Methods to set an upper, one-sided 100(1 - alpha) percent confidence limit (1 - alpha is a preassigned confidence coefficient) on the unreliability of certain weapon components are developed. The time-to-failure is assumed to be distributed normally. The method is based upon life tests in which every member of a randomly selected sample is tested to failure in an environment which simulates the actual operational environment. (Author)

AD-286 348 Div. 15
(TISTP/TL) OTS price $2.60

System Development Corp., Santa Monica, Calif.
A SIMPLE SORTING ALGORITHM.
by Thomas N. Hibbard. 29 Aug 62, 18p. incl. table, 4 refs. (Technical memo. no. TM-718/000/01)
Unclassified report

DESCRIPTORS: *Equations, *Sequences, *Operators (Mathematics), *Functions, Numbers, Tables.

The Bose-Nelson sequence is discussed, which is the shortest known fixed sequence of comparison. A simple algorithm is presented with a negligible storage requirement for generating the comparison by one in the order in which they are needed for sorting.

AD-286 382 Div. 15
(TISTP/WH) OTS price $2.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
ON A SELECTION AND RANKING PROCEDURE FOR GAMMA POPULATIONS,
by Shanti S. Gupta. 6 Aug 62, 22p. tables, 9 refs. (Technical rept. no. 61)
(Contract Nonr-22553, Proj. NR-042-002)
Unclassified report

DESCRIPTORS: *Analysis of variance, *Statistical distribution, *Groups (Mathematics).

The problem of selecting a subset of k gamma populations which includes the ''best'' population, i.e. the one with the largest value of the scale parameter, is studied as a multiple decision problem. The shape parameters of the gamma distributions are assumed to be known and equal for all the k populations. Based on a common number of observations from each population, a procedure R is defined which selects a subset which is never empty, small in size and yet large enough to guarantee with preassigned probability that it includes the best population regardless of the true unknown values of the scale parameters θ_i. Expression for the probability of a correct selection using R are derived and it is shown that for the case of a common number of observations the infimum of this probability is identical with the probability integral of the ratio of the maximum of k-1 independent gamma chance variables to another independent gamma chance variable, all with the same value of the other parameter. It is shown that this function attains its maximum when the parameters θ_i are equal. (Author)

AD-286 384 Div. 15
(TISTP/WH) OTS price $3.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
X CHART CONTROL LIMITS BASED ON A SMALL NUMBER OF SUBGROUPS,
by Frederick S. Hillier. 4 Sep 62, 29p. incl. tables, 21 refs. (Technical rept. no. 63)
(Contract Nonr-22553, Proj. NR-042-002)
Unclassified report

DESCRIPTORS: *Groups (Mathematics), *Analysis of variance, *Quality control, *Statistical processes, Statistical distributions.

Conventional X chart control limits provide a very unreliable basis for indicating when the process has fallen out of statistical control unless these limits are based on a fairly large number of subgroups, say 25 or more. A method is presented which provides statistically sound control limits regardless of the smallness of the number of subgroups observed. This permits the reliable use of X charts during the crucial initiation of a new process, during the start-up of a process just brought into statistical control again, or for any process whose total output is not very large. The method is simple, requiring only the use of Table 4.1, and the interpretation of results is the same as with conventional control limits. Finally, even when conventional control limits are used, the results given in Table 3.1 permit a precise probabilistic evaluation of these control limits. (Author)

AD-286 389 Div. 15
(TISTP/MS) OTS price $4.60

Mathematical Research Center, U. of Wisconsin, Madison.
ERROR BOUNDS IN FINITE DIFFERENCE APPROXIMATION TO SOLUTIONS OF SYMMETRIC HYPERBOLIC SYSTEMS,
by H. F. Weinberger. Mar 58, 43p. 7 refs.
(MRC Technical summary rept. no. 24)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Partial differential equations, Matrix algebra, Errors, Inequalities, Functions.

AD-286 398 Div. 15
(TISTP/TL) OTS price $3.60

Mathematical Research Center, U. of Wisconsin, Madison.
LOWER BOUNDS FOR HIGHER EIGENVALUES OF SECOND ORDER OPERATORS BY FINITE DIFFERENCE METHODS,
by H. F. Weinberger. 26 Aug 57, 34p. 19 refs.
(MRC Technical summary rept. no. 7)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Integral equations, *Matrix algebra, *Differential equations, *Operators (Mathematics), *Difference equations, Functions, Inequalities.

Lower bounds for all the eigenvalues or an arbitrary second order self-adjoint elliptic differential operator on a bounded domain R with zero boundary conditions are given in terms of the eigenvalues of an associated finite difference problem. When R is sufficiently smooth, the lower bounds converge to the eigenvalues themselves as the mesh size approaches zero. A certain class of self-adjoint systems of elliptic differential equations containing no mixed derivatives is also treated. Upper bounds for the eigenvalues of a differential operator can always be found by the Rayleigh-Ritz method. That is, one puts piecewise differentiable functions vanishing on the boundary into the Poincare inequality. It was pointed out by Courant that in the case of second order operators one can reduce the problem of upper bounds to a finite difference eigenvalue problem by using piecewise linear functions. (Author)

AD-286 500 Div. 15
(TISTP/GRW) OTS price $1.10

Naval Research Lab., Washington, D. C.
SOME EXACT SOLUTIONS TO THE THREE-DIMENSIONAL EQUATION OF RADIATIVE TRANSPORT.
Final rept.,
by W. R. Faust. 26 Sep 62, 5p. incl. illus. 7 refs. (NRL rept. no. 5838)
Unclassified report

DESCRIPTORS: *Integral equations, *Integral transforms.

Fourier techniques are applied to obtain an exact solution of the three-dimensional integro-differential equation of radiative transport for

a point isotropic source imbedded in an infinite medium. Results of these calculations are extended to obtain the solution for a point source radiating along the z axis (beam of radiation). (Author)

AD-286 521 Div. 15
(TISTP/GRW) OTS price $1.10

Columbia U., New York.
A TEST FOR EQUALITY OF MEANS WHEN COVARIANCE MATRICES ARE UNEQUAL,
by T. W. Anderson. 10 Sep 62, 4p. 5 refs.
(Rept. no. CU-64-62-Nonr-266(33)MS)
(Contract Nonr-26633, Proj. NR 042-034)
Unclassified report

DESCRIPTORS: *Statistical distributions, *Statistical analysis.

AD-286 546 Div. 15
(TISTP/GRW) OTS price $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
FOUNDATIONS OF A THEORY OF ALGEBRAIC CODES. PART II. GLOBAL THEORY,
by Stephen S. Shatz. 20 Sep 62, 22p. (Rept. no. 52G-4, pt. 2)
(Contract AF 19(628)500)
(AFESD TDR 62-139) Unclassified report

DESCRIPTORS: *Algebraic topology, Mathematics.

AD-286 547 Div. 15, 6
(TISTP/GRW) OTS price $4.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
PROJECT 861 COMPUTER PROGRAMMING SYSTEM; MATHEMATICAL ANALYSIS FOR COMPUTATION OF RADAR POINTING DATA.
14 Sep 62, 48p. incl. illus. (Rept. no. 21G-2)
(Contract AF 19(628)500)
(AFESD TDR 62-137)
Unclassified report

DESCRIPTORS: *Radar antennas, *Mathematical computer data, Satellite vehicle trajectories, Matrix algebra, Probability, Direction finding.

AD-286 548 Div. 15
(TISTP/GRW) OTS price $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
FOUNDATIONS OF A THEORY OF ALGEBRAIC CODES. PART I: LOCAL THEORY,
by Stephen S. Shatz. 20 Sep 62, 21p. 1 refs.
(Rept. no. 52G-4, pt. 1)
(Contract AF 19(628)500)
(AFESD TDR 62-138)
Unclassified report

DESCRIPTORS: *Algebraic topology, Mathematics.

Error correcting codes are studied from a new point of view. The aim was to find a set of foundations for the theory of error correcting codes which would make this theory appear more like the usual algebraic theories occurring in mathematics. The foundations are introduced by defining the notion of affine precode. Affine precodes, as a class, satisfy the basic requirements for an algebraic theory, and every error correcting code is an affine precode. (Author)

AD-286 549 Div. 15
(TISTP/GRW) OTS price $1.10

California Inst. of Tech., Pasadena.
(No title).
Final rept., 1 Sep 61-31 May 62,
by F. Bohnenblust. 11 Oct 62, 6p.
(Grant no. Nonr(G)00030-61)
Unclassified report

DESCRIPTORS: *Functions, *Differential geometry, *Series, *Probability.

AD-286 555 Div. 15
(TISTB/AW) OTS price $1.60

System Development Corp., Santa Monica, Calif.
SOME QUEUING PROBLEMS WITH BALKING AND RENEGING - II,
by C. J. Ancker, Jr. and A. V. Gafarian.
28 Sep 62, 17p. incl. illus. 8 refs. (Rept. no. SP-372/002/01)
Unclassified report

DESCRIPTORS: *Probability, *Sampling, Statistical distributions, Special functions, Operations research.

Balking (refusing to join the queue) and reneging (leaving the queue after entering) are considered. The model's assumptions are listed, and results obtained for the steady state are reported. These results are also obtained for a pure balking system (no reneging) by setting the reneging parameter equal to zero; that this case may be interpreted as the simple machine-servicing problem for which some of the results appear to be new. (Author)

AD-286 731 Div. 15, 28
(TISTB/AW) OTS price $1.10

System Development Corp., Santa Monica, Calif.
CONFIDENCE INTERVALS FOR DIFFERENCE OF FREQUENCIES IN MATCHED SAMPLES,
by John E. Walsh. 1 Oct 62, 4p. 2 refs. (Rept. no. SP-979)
Unclassified report

DESCRIPTORS: *Sampling, *Statistical tests, Statistical distributions, Experimental data, Probability, Statistical analysis.

Stuart's test for the comparison of frequencies in matched samples is discussed, where the data consist of bivariate observations such that the first coordinates, considered by themselves, constitute the trials of one binomial population and, likewise, the second coordinates are the trials of a second binomial population. The null hypothesis asserts that these binomial populations are equal (have the same probability for success). Stuart's results are extended to obtain confidence intervals for the difference between the probabilities of success for the two binomial populations. Correlation is permitted to occur between the entries of a bivariate observation and different bivariate observations can have different (unknown) values for this correlation. (Author)

AD-286 741 Div. 15
(TISTP/MS) OTS price $1.60

Mathematics Research Center, U. of Wisconsin, Madison.
SOLUTION OF CERTAIN NONLINEAR DIFFERENTIAL EQUATIONS BY SERIES OF EXPONENTIAL FUNCTIONS,
by Wolfgang Wasow. June 57, 12p. 3 refs. (MRC technical summary rept. no. 5)
(Contract DA 11-022-ORD-2059)
Unclassified report

Division 15 - MATHEMATICS

DESCRIPTORS: *Non-linear differential equations, *Functions, Series, Inequalities.

Almost periodic solutions of systems of non-linear differential equations of the form $y' = f(y) + \sum_{k=1}^{m} g_k e^{i\omega_k x}$ are constructed, where y is an n-dimensional vector, the dash indicates differentiation with respect to x, the g_k are constant vectors, and the ω_k are real, not necessarily commensurable, numbers. The components of the vector $f(y)$ are assumed to be analytic functions of the components of y It will be proved that there exists, under certain assumptions, a particular solution of the form $y = a_0 + \sum_{r=1}^{\infty} a_r e^{i\zeta_r x}$. (Author)

AD-286 742 Div. 15
(TISTP/WH) OTS price $2.60

RAND Corp., Santa Monica, Calif.
THE METHOD OF LEAST SQUARES AND OPTIMAL FILTERING THEORY,
by Y. C. Ho. Oct 62, 24p. 7 refs. (Research memo. RM-3329-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Least squares method, *Celestial mechanics, *Orbital flight paths, *Mathematical prediction.

The correspondence between the well-known method of least squares and the more recent optimal filtering theory of Kalman is demonstrated. It shows that via a simple lemma on matrix inversion, most of the results in linear filtering and prediction theory can be easily derived. The connection of the least square method with the so-called Duality Principle in optimal control theory is also discussed. This connection places in evidence the mathematical similarities between problems of control and problems of prediction. The Memorandum concludes with a proposed application for orbit determination of a 24-hour satellite using the techniques described. This application is concerned with computing corrections to the satellite's orbital parameters based on noisy observations of azimuth and elevation angles by improving an initial orbital parameter estimation through additional observations. The orbital parameter corrections may then be used as the input to an orbit transfer process or to refine a preliminary orbit. (Author)

AD-286 743 Div. 15
(TISTP/TL) OTS price $2.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
SYNTHESIS OF LINEAR SEPARABILITY BY MEANS OF LINEAR PROGRAMMING,
Technical report on Mathematics,
by Sze-Tsen Hu. Mar 62, 1v. incl. illus. 10 refs. (Rept. no. 6-90-62-38)
Unclassified report

DESCRIPTORS: *Linear programming, *Functions, Equations, Numbers, Synthesis, Inequalities, Matrix algebra.

The solution to the problem of assigning minimal weights to the separating system for linearly separable functions is considered. The method uses previously derived concepts for ordering the functions in what is called a canonical partial order, to reduce the number of equations involved. Linear programming techniques are used in determining the minimal weight values; the reduction in the total number of equations enables reducing the solution time, and hence enables extension to systems with more variables. (Author)

AD-286 794 Div. 15, 4
(TISTM/REB) OTS price $4.60

RAND Corp., Santa Monica, Calif.
THE SIMULATION OF MULTI-COMPONENT DISTILLATION,
by E. C. Deland and M. B. Wolf. Oct 62, 36p. incl. illus. tables, 18 refs.
(Memo. RM-3258-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Fractionation, *Simulation, *Analog computers, Chemical equillibrium.

A new method is proposed for the simulation of multi-component petroleum distillation columns. This method takes advantage of the power of mathematical programming techniques for computing the equilibrium states of physiochemical processes. The formal procedure was proposed and developed for other chemical systems, but it is perfectly general, being able to incorporate changes of phase, external sources or sinks of mass or energy, and differential equations which describe system dynamics if they are relatively slow with respect to the chemical dynamics. Using a theorem of the mathematician Gibbs, a chemical equilibrium may be defined in terms of the thermodynamic free-energy of each of the components. At equilibrium, the sum of the free energies will be minimized. A free energy (nonlinear) function is defined and then minimized under the natural physical (linear) restraints of the system. On the analog computer chosen because of the ease of representing the system dynamics and (nonlinear) heat and mass balance equations-the solution method is by steepest descent. A digital solution has also been devised. (Author)

AD-286 809 Div. 15
(TISTP/GRW) OTS price $1.60

Electronics Research Lab., U. of Calif., Berkeley.
THE CAPACITIES OF CERTAIN CHANNEL CLASSES UNDER RANDOM CODING,
by D. Blackwell, L. Breiman, and A. J. Thomasian. 20 Feb 62, 15p. 7 refs. (Series no. 60, Issue no. 437)
(Contract Nonr-22253)
Unclassified report

DESCRIPTORS: *Matrix algebra, *Probability, Information theory, Potential theory.

AD-286 848 Div. 15
(TISTP/MS) OTS price $15.00

Aeronautical Research Lab., Office of Aerospace Research, Wright-Patterson Air Force Base, Ohio.
PERCENTAGE POINTS OF THE RATIO OF TWO RANGES AND RELATED TABLES,
by H. Leon Harter. July 62, 223p. incl. tables, 18 refs. (Rept. no. ARL 62-378)
(Proj. 7071)
Unclassified report

DESCRIPTORS: *Statistical tests, *Statistical distributions, *Probability, *Sampling, Functions, Tables.

In testing the hypothesis that the variances of two populations are equal, a test based on the ratio F' of the ranges of two samples, one from

each population, is simpler than the conventional F test based on the ratio of the sample variances, and it is only slightly less powerful. In order to apply such a test, more extensive and more accurate tables of the percentage points of the ratio of the ranges of two samples from a normal population are needed. This required the computation, by numerical integration, of auxiliary tables of the probability density function of the range and both the probability density function and the cumulative distribution function of the ratio of two ranges, to 8, 6, and 5 decimal places, respectively. The next step was the computation, to 4 significant figures, by inverse interpolation in the table of the cumulative distribution function, of the percentage points of the ratio of two ranges. Finally, a table was computed. This report contains all of the probability density function tables together with a description of the method of computation, and an example of the use of the tables of percentage points and power. (Author)

AD-286 897 Div. 15
(TISTP/GRW) OTS price $1.60

Operations Research Center, U. of Calif., Berkeley.
COMPACT BASIS TRIANGULARIZATION FOR THE SIMPLEX METHOD,
by George B. Dantzig. 3 Aug 62, 12p. incl. illus. (Research rept. no. 28; IER 172-33) (Contract Nonr-22283)

Unclassified report

DESCRIPTORS: *Scheduling, *Matrix algebra.

The inverse of the basis in the simplex method serves no function except as a means for obtaining the representation of the vector entering the basis and for determining the new price vector. For this purpose one of the many forms of substitute inverses (such as the well known product form of the inverse) would do just as well, in fact, may have certain advantages in computation. There is interest in developing, for a sparce matrix, a substitute inverse with as few nonzero entries as possible. Two ways to do this are: (1) the basis could be reduced to triangular form by successively selecting for pivot position that row and that column whose product of nonzero entries (excluding the pivot) is minimum, and (2) for bases whose nonzeros appear in a band on staircase about the diagonal, proper selection of pivots could result in a compact substitute inverse with no more nonzeros than the original basis. (Author)

16. MEDICAL SCIENCES

AD-285 669 Div. 16
(TISTB/SAT) OTS price $7.60

New York State Coll. of Agriculture, Cornell U., Ithaca.
SELECTION EXPERIMENTS IN NEUROSPORA,
by W. T. Federer and K. E. Papa. 1962, 73p. incl. illus. tables, refs. (Technical rept. no. 9)
(Contract Nonr-40139, Proj. 042-212)
Unclassified report

DESCRIPTORS: *Neurospora, Culture media, Selection, Drosophila, Growth, Spores, Probability, Fungi, Genetics.

This report includes:
A MODEL TESTING PROBLEM IN GENETICS, by W. T. Federer, D. S. Robson, and A. M. Srb. Jan 59. (Rept. no. BU-103-M)

TECHNIQUES AND RELATED GENETIC RESULTS FOR A QUANTITATIVE INHERITANCE STUDY IN NEUROSPORA CRASSA, by Keith H. Thompson. Apr 60 (Rept. no. BU-114-M)

CROSSING PLAN FOR NEUROSPORA EXPERIMENT TO DETERMINE EFFECT OF SELECTION THROUGH RECOMBINATION FREE OF HETEROTIC EFFECTS, by K. E. Papa and W. T. Federer. Dec 60 (Rept. no. BU-128-M)

EFFECTIVENESS OF SELECTION BASED ON VARIABILITY ACHIEVED THROUGH RECOMBINATION UNCOMPLICATED BY HETEROTIC EFFECTS IN NEUROSPORA, by K. Papa. Oct 61 (Rept. no. BU-138-M)

SELECTION MODELS, by Walter T. Federer. May 62. (Rept. no. BU-145-M)

AD-285 792 Div. 16, 28, 8
(TISTB/AW) OTS price $1.60

Air Force Cambridge Research Labs., Bedford, Mass.
ON THE MECHANISM OF PERMANENT MEMORY,
by E. M. Dewan. July 62, 7p. 17 refs. (AFCRL 62-521)
Unclassified report

DESCRIPTORS: *Biophysics, *Memory, *Brain, Transducers, Test methods, Molecular structure, Neurology, Theory.

Hypnosis recall experiments and Penfield's brain stimulation experiments seem to indicate that the brain can permanently record all subjective conscious experience in complete detail. Many people have suggested that the medium for information storage is macromolecular; however, no transducer mechanism for the process of recording neural information in molecular structure has yet been suggested. In this paper the hypothesis is made that N. Wiener's nonlinear oscillatory entrainment 'template' idea might play the role of the transducer of permanent memory. Experiments are suggested which could test this hypothesis. (Author)

AD-285 817 Div. 16
(TISTB/CCH) OTS price $3.60

Douglas Aircraft Co., Inc., El Segundo, Calif.
DYNAMIC VISION I. THE LEGIBILITY OF EQUALITY SPACED ALPHA-NUMERIC SYMBOLS,
by S. Lippert, 12 July 62, 35p. incl. illus. tables, 5 refs. (Rept. no. LB 30961)
(Contract Nonr 107600)
Unclassified report

DESCRIPTORS: *Vision, *Moving target indicators, Velocity, Instrumentation, Visual acuity.

A trial study was conducted on the ability of observers to identify moving targets consisting of alpha-numeric symbols. The targets were randomly assigned and regularly spaced on an endless belt which was viewed from a distance of 38 ± 2 inches. The targets subtended an angle of 39 minutes. The space between targets subtended an angle of 51 minutes. The targets moved vertically, from top to bottom in the frontal plane. Six subjects were tested on criteria of zero legibility and 100 percent legibility when the targets were viewed through apertures 2-inches wide and 8-inches high, and 2-inches wide and 20 inches high. Performance was measured in terms of the angular velocity of the targets past the observer's eyes. As apertture height increased, the legibility criteria could be met at higher angular velocities of the stimulus materials. The mean angular velocites for the zero legibility criterion were approximately three times as great as for the 100 per cent legibility criterion. (Author)

AD-285 937 Div. 16
(TISTB/MD) OTS price $1.10

California U., San Francisco, Medical Center.
EFFECTS OF DEPLETION OF SOME PHYSIOLOGICAL SUBSTANCES ON THE DEVELOPMENT OF ACUTE RADIATION SICKNESS.
Annual progress rept., 1 Sep 61-1 Sep 62,
by Robert S. Stone, Aldo N. Corbascio, and Nicholas V. Carroll. 1 Sep 62, 9p. incl. table.
(Contract DA 49-193-md-2191)
Unclassified report

DESCRIPTORS: *Radiation effects, *Oxidation-reduction reactions, Blood, Tissues, Laboratory animals, X rays, Liver, Kidneys, Spleen, Biochemistry, Ascorbic acid.

A preliminary study was made of the effects of whole-body exposure to penetrating ionizing radiations (X-rays, 400 rads) on blood and tissue levels of ascorbic, dehydro-ascorbic and diketogulonic acid in guinea pigs. This was undertaken to test the hypothesis that the rapid oxidation of ascorbic acid to its dehydro-ascorbic form may be responsible for radiobiological damage. (Author)

AD-286 022 Div. 16
(TISTB/MD) OTS price $.50

Biomedical Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
SLEEP AND ALTERED PROPRIOCEPTIVE INPUT AS RELATED TO WEIGHTLESSNESS: WATER IMMERSION STUDIES.
Final rept., Oct 61-Feb 62 on Biophysics of Flight,
by Duane E. Graveline and Michael McCally.
Aug 62, 12p. incl. illus. 8 refs.
(Proj. 7222)
(AMRL TDR 62-83)
Unclassified report

DESCRIPTORS: *Weightlessness, *Sleep, Man, Sensory deprivation, Needs, Reaction (Psychology), Water, Simulation, Proprioception.

The 'free-floating' condition of immersion is associated with substantial alterations in mechanoreceptive feedback to the central nervous system in a manner similar to the free-floating condition of weightlessness. One area having

rather immediate operational application concerns sleep under these conditions. Electroencephalographic and electrooculographic recordings were made during sleep of completely immersed, neutrally buoyant subjects. Sleep records were obtained while using tether and clamshell sleeping facilities and were compared to each subject's normal bedrest sleep records and subjective impressions. The results are presented and their possible application to prolonged weightlessness is discussed. (Author)

AD-286 048 Div. 16
(TISTB/MD) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
PROGRESS AND PROSPECTS IN IDIOPHYLAXIS (BUILT-IN INDIVIDUAL SELF-PROTECTION OF THE COMBAT SOLDIER),
by Marion B. Sulzberger. 1962, 16p. incl. illus. tables.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, United States Military Academy, West Point, New York.

DESCRIPTORS: *Preventive medicine, Immunization, Adjustment (Psychology), Radioprotective drugs, Military personnel, Skin.

The reliability of a weapons system can never exceed that of its most delicate essential component. More often than not this component of a weapons system is the man who has been trained to use it. This man is likely to be a trained specialist or combat soldier set down in some remote and strange area. There have been expansions in medicine; kaleidoscopic rearrangements of plans and policies; introduction of new weapons, new means of transportation and communication; actual and potential dispersion of forces throughout the world and increasing risks of sudden encounters with hostile climates and environments. The soldier's reliability, his mental and physical health, cannot be maintained except by a medical research and development program which is scientifically and medically up to the minute and rapidly responsive to the ever-changing military needs. One major goal is giving each combat soldier his medical idiophylaxis. The present and future of idiophylaxis will be discussed with particular emphasis on protective mechanisms of the human skin. (Author)

AD-286 050 Div. 16
(TISTB/MD) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
WOUND HEALING, COLLAGEN, AND HUMORAL GROWTH-PROMOTING AGENTS,
by H. Rosen, C. W. Berard and others. 1962, 14p. incl. illus. tables, 20 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, United States Military Academy, West Point, New York.

DESCRIPTORS: *Healing, *Collagen, Biosynthesis, Biochemistry, Molecular structure, Wounds, Separation, Fractionation, Deuterium oxide, Labeled substances, Tracer studies, Laboratory animals.

Physical, biochemical, surgical and histological techniques were used in a series of studies on many aspects of wound healing. Acetic acid solubilized collagen is polydisperse and this mixture was fractionated into 3 high molecular weight components and a peptide complex. While the three high molecular weight components resemble the parent collagen molecule very closely in their amino acid composition, they do differ slightly but significantly from one another. The peptide fraction was separated into some 14 fractions; they have little hydroxyproline and much proline; they may represent an early stage in collagen development, that is, they are precursors. Evidence to substantiate this hypothesis was obtained through metabolic studies using C14 glycine. Dog wound fluid ultrafiltrate, a low molecular weight component which is a growth accelerator for bacterial and mammalian cells, was isolated. An in-vivo collagen defect was created in rats by feeding them deuterium oxide. This technique provided a tool for the study of the interaction of collagen with the ground substance: this method was applied to elucidate how the mucopolysaccharides of ground substance stabilize collagen, a vital subject about which little is now known. (Author)

AD-286 055 Div. 16
(TISTB/MD) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
MATERIALS FOR BIOMECHANICAL APPLICATIONS,
by Fred Leonard, Carl A. Nielson and Joshua Nelson. 1962, 13p. incl. illus. tables, 6 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Prosthetics, *Arteries, *Polymers, *Cartilage, Elastomers, Synthesis, Physical properties, Mechanical properties, Dacron, Expanded plastics.

Recent advances in surgery have enhanced the need for providing biologically receptive polymeric surgical repair materials which can be utilized in replacing or repairing damaged and diseased tissues and organs. The important parameters, porosity and molecular structure, which appear to be relevant to the biological receptivity of such materials, are discussed and materials design criteria evolved. Based upon these criteria, vulcanizable terpolymers of the acrylic and methacrylic acid esters and methacrylamide were selected as a class of materials for further investigation. The terpolymers were synthesized, their properties elucidated, and procedures for applying these materials for fabricating artificial arteries and hip prostheses were developed. (Author)

AD-286 060 Div. 16
(TISTB/SAT) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
PROBLEMS AND PROGRESS IN THE STUDY OF ORAL TOXICITY OF BACTERIAL TOXINS,
by Carl Lamanna. 1962, 15p. incl. tables, 20 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962 at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Bacterial toxins, *Botulism, Lymph, Dosage, Poisons, Toxicity, Digestive system, Proteins, Accidents, Food.

Food poisoning is caused by the consumption of harmful chemical products produced by the growth of bacteria. Absorption from the intestine into the blood stream takes place by way of the lymphatic system draining the intestine. Evi-

dence was presented for the concept that even the normal intestine presents no absolute barrier to systemic absorption of protein by way of the lymphatics. The high potency of bacterial toxins accounts for their oral toxicity. Only fantastically small amounts of toxins need escape digestion and be absorbed in order for them to still remain poisonous upon consumption and exposure to digestive juices. A hypothesis was presented that relates food poisoning by bacterial toxins to accidental circumstances of contact with these poisons rather than any unusual chemical properties that permit them to escape the vicissitudes normal to proteins in the gut. (Author)

AD-286 061 Div. 16
(TISTB/SAT) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
EFFECT OF MAFENIDE (SULFAMYLON (R)) AND PENICILLIN IN TOPICAL THERAPY OF C. PERFRINGENS-CONTAMINATED EXPERIMENTAL WOUNDS,
by Janice A. Mendelson. 1962, 12p. incl. illus. 24 refs.
Unclassified report

Presented at the 1962 Army Science Conference, 20-22 June 1962 at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Clostridium perfringens, *Antibiotics, Sulfonamides, Penicillin, Goats, Dosage, Staphylococcus, Anaerobic spores, Gas gangrene, Wounds.

The topical use of penicillin and of mafenide alone and in combination as an expedient treatment of massive open wounds with C. perfringens contamination was tested in a study utilizing 150 goats. (Author)

AD-286 067 Div. 16
(TISTB/CCH) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
A FLUID AMPLIFIER HEART PUMP,
by K. E. Woodward, T. G. Barila and others.
1962, 14p. incl. illus. 3 refs.
Unclassified report

Presented at the 1962 Army Science Conference, 20-22 June 1962 at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Artificial heart, *Pumps, Circulatory system, Pressure, Heart, Reliability.

Fluid amplification, a recent Army invention concerned with the control of flowing fluids without moving parts, was applied to the powering and control of an extracorporeal heart pump. Except for an artificial ventricle and two artificial heart valves the fluid amplifier pump has neither moving control parts nor electronics. The output is pulsatile and its average rate of flow varies directly with filling pressure and inversely with vascular and other resistances, to achieve flow regulation. Atrial contraction and venticular fibrillation, a type of heart failure, can be simulated. Because of the design, high reliability, long life and low cost are achieved. Early evaluation tests suggest its performance capabilities and hemolytic characteristics are at least equal to those of the better available heart pumps. (Author)

AD-286 102 Div. 16
(TISTB/CCH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CHANGE IN THE DYNAMICS OF THE FORMATION OF ELECTRIC REACTIONS OF THE VISUAL ANALYSOR IN THE PRESENCE OF HYPOXIA,
by Mei-Lei. 23 May 62, 12p. incl. illus. 8 refs. (Trans. no. FTD-TT-62-769 from Fiziologicheskiy Zhurnal SSSR im. I. M. Sechenova, 48:1, pp. 11-15, 1962)
Unclassified report

DESCRIPTORS: *Vision, *Anoxia, Brain, Electroencephalography, Visual perception, Light transmission, USSR, Electrical properties.

AD-286 105 Div. 16
(TISTB/CCH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A RIVAL OF GINSENG,
by Boris Sadekov. 4 June 62, 4p. (Trans. no. FTD-TT-62-556 from Sovetskaya Latviya, p. 4, 26 Jan 62)
Unclassified report

DESCRIPTORS: *Plants, Drugs, Toxicity, Chemotherapeutic agents, USSR.

AD-286 107 Div. 16, 28
(TISTB/CCH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
IMPARTED RHYTHM,
by A. Prokhorov. 4 June 62, 7p. (Trans. no. FTD-TT-62-557 from a Newspaper Article (Title Unknown))
Unclassified report

DESCRIPTORS: *Rhythm, *Brain, Electric potential, Exercise, Man, Laboratory animals, Electroencephalography, USSR, Reaction (Psychology).

AD-286 108 Div. 16, 25
(TISTB/CCH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INVESTIGATION OF TONIC REFLEXES ON STIMULATION OF DIFFERENT HUMAN SENSE ORGANS,
by G. M. Margolin. 28 May 62, 7p. incl. illus. 5 refs. (Trans. no. FTD-TT-62-558 from Fiziologicheskiy Zhurnal SSSR im. I. M. Sechonova, 48:1, pp. 95-97, 1962)
Unclassified report

DESCRIPTORS: *Conditioned reflex, *Motor reaction, *Sound, Instrumentation, Sensory perception, Analgesics, USSR, Stimulation.

AD-286 127 Div. 16, 20
(TISTB/CCH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CELL - COSMOS - MARS.
5 June 62, 3p. (Trans. no. FTD-TT-62-603 from Pravda Ukrainy, p. 4, 26 Aug 1961)
Unclassified report

DESCRIPTORS: *Radiation effects, Gamma rays, Ultraviolet radiation, Temperature, Laboratory animals, Protozoa, Paramecium, Countermeasures, Chemicals, Cells (Biology).

AD-286 201 Div. 16
(TISTB/LH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
IN THE SPACEFLIGHT LABORATORY,
by N. N. Gurovskiy and M. A. Gerd. 8 June 62, 15p. incl. illus. (Trans. no. FTD-TT-62-652 from Nauka i Zhizn'. No. 10, pp. 21-28, 1961)
Unclassified report

DESCRIPTORS: *Space flight, *Dogs, Feeding, Stimulation, Privation, Reaction (Psychology), Physiology, Experimental data, Laboratories, Weightlessness.

AD-286 257 Div. 16
(TISTB/MD) OTS price $.75

Diamond Ordnance Fuze Labs., Washington, D. C.
SOME ENGINEERING CONSIDERATIONS OF THE HUMAN CARDIOVASCULAR SYSTEM (THE RESONANT ARTERIAL SYSTEM),
by Kenneth E. Woodward, Timothy G. Barilla, and Daniel B. Nunn. 7 Feb 62, 32p. incl. illus. 8 refs. (Rept. no. TR-1075)
(DOFL Proj. 31000)
Unclassified report

DESCRIPTORS: *Circulatory system, Mechanical properties, Fluid flow, Fluid mechanics, Elasticity, Resonance, Arteries, Heart, Blood pressure, Man, Energy.

A study was made from an engineering viewpoint primarily to determine the need for (1) a human heart that produces a pulsating rather than steady flow and (2) an elastic circulatory system. It is suggested that the normal rhythmic contractions of the heart may produce pulsed flows which resonate with the natural frequencies of the arterial system. As a consequence the magnitudes of the myocardial forces and energies expended by the heart would then be minimal and tightly bounded for large flow rate variations. Sufficiently great and uncorrected changes in either or both the resonant character of the arterial system or the pulsed flows may cause the heart to overwork and die prematurely or may result in other system malfunctions. Resonance then may possible be a major physical design principle upon which the human cardiovascular system is based and which allows it to operate within its many constraints. (Author)

AD-286 267 Div. 16
(TISTB/MD) OTS price $1.10

Cornell U., Ithaca, N. Y.
MECHANISM OF ENZYME ACTION.
Final project rept., 1 May 58-30 Apr. 62,
by Harold A. Scheraga. 23 July 62, 9p. 9 refs.
(Contract Nonr 40136, Proj. NR 108-406)
Unclassified report

DESCRIPTORS: *Thrombin, *Fibrin, *Water, *Solutions, Molecular structure, Thermodynamics, Protein solutions.

The nature of thrombin and fibrin on the thermodynamics of water and hydrogen and hydrophobic bonding in solutions of hydrocarbons and proteins, which play a role not only in the thrombin-fibrinogen reaction but also in reactions of enzymes in general, was studied. (Author)

AD-286 321 Div. 16
(TISTB/MD) OTS price $4.60

Cordis Corp., Miami, Fla.
DETECTION AND MEASUREMENT OF ANTIGEN-ANTIBODY REACTIONS.
Annual progress rept., 1 Oct 61-30 Sep 62,
by William P. Murphy, Jr. 30 Sep 62, 32p. illus. 14 refs.
(Contract DA 49-193-md-2203)
Unclassified report

DESCRIPTORS: *Antigens, *Antibodies, *Diphtheria toxoid, *Antitoxins, *Immunology, *Viruses, Fluorescent dyes, Labeled substances, Test equipment, Laboratory animals, Polariscopes, Test methods.

The following aspects of a program to develop methods for the detection and measurement of antigen - antibody reactions using the fluorescent labelling technique are reported: (1) a technique was developed for growing turnip yellow mosaic virus and producing antibody in rabbits, providing a suitable immunological system for the current investigation, (2) successful experiments were performed using labelled diptheria toxoid as a reagent to detect diptheria antibodies, (3) disintegration of bacteria to form fragments of low molecular weight suitable for the technique under consideration was achieved and antibodies to the cell walls prepared, and (5) instrumentation sensitivity and reliability were improved by changes in the optical and detecting systems, as well as by the incorporation of additional controls. (Author)

AD-286 339 Div. 16
(TISTB/SAT) OTS price $7.60

Biological Labs., Frederick, Md.
BIBLIOGRAPHY ON COCCIDIOIDOMYCOSIS.
2 ed. Sep 59, 77p. (Publication no. 105)
Unclassified report

DESCRIPTORS: *Bibliography, *Coccidioides, Fungi, Fungus infections.

AD-286 340 Div. 16
(TISTB/SAT) OTS price $11.00

Biological Labs., Frederick, Md.
BIBLIOGRAPHY ON TULAREMIA.
4th ed. 25 Nov 58, 144p.
Unclassified report

DESCRIPTORS: *Bibliography, *Tularemia, Pasteurella.

AD-286 381 Div. 16, 29
(TISTB/LH) OTS price $1.60

Springfield Coll., Mass.
ELECTROGONIOMETRIC STUDY OF WALKING ON HIGH HEELS,
by Philip D. Gollnick, Charles M. Tipton, and Peter V. Karpovich. 18 Sep 62, 7p. incl. illus. tables, 2 refs.
(Contract DA 49-007-md-889)
Unclassified report

DESCRIPTORS: *Shoes, Posture, Joints, Goniometers.

Angles were measured in young girls standing still or walking barefoot or wearing high heels. They walked on horizontal and on 5 and -5 degree inclined planes. A few records were also obtained during running on a horizontal plane. The high heels increased the extension in the ankle joint during standing and walking. This increase was about 20 degrees, the difference being statistically significant. During running the high heels caused a decrease in the knee angle at all points which reduced somewhat the amplitude of the knee movement. In standing the high heels had no definite effect on the knee

angle. Due to a slight shift required for body balance one may find either no change or a slight flexion or extension on the same person. (Author)

AD-286 386 Div. 16, 20
(TISTB/CCH) OTS price $1.60

Physiological Research Lab., Springfield Coll., Mass.
PATELLAR REFLEX TIME,
by Charles M. Tipton, Peter V. Karpovich, and Donald R. Gottshall. 25 Sep 62, 9p. illus. tables, 11 refs.
(Contract DA 49-007-md-889)
Unclassified report

DESCRIPTORS: *Motor reactions, *Reaction time, *Neuromuscular transmission, Heat, Temperature, Legs, Muscles, Motion.

Changes in patellar reflex time under various conditions were studied on 69 subjects. Reliability of reflex time measured on the same day two-three hours apart and also on different days was found to be high, being 0.94 and 0.90 respectively. Both legs of 15 subjects were heated in a ''Baker'' at a temperature of 130 F for 30-40 minutes. The reflex time increased by 7.8 msec. (9.6%), the difference being significant at the 0.1 level. After an ergocycle ride to exhaustion the reflex time became longer. Neuromuscular excitability of the peroneus brevis muscle and the superficial peroneal nerve was measured after an exhaustive ergocycle ride for nine subjects. The excitability of both the nerve and the muscle slightly decreased (without being significant), but the nerve-muscle differential remained the same. Physical exercise to exhaustion and exposure to heat prolong reflex time. Mild exercise tends to shorten reflex time. No relation was found between reflex time and neuromuscular excitability. (Author)

AD-286 390 Div. 16
(TISTB/SAT) OTS price $3.60

Bermuda Biological Station, St. George's West.
ANIMAL-SEDIMENT INTERRELATIONSHIPS ON THE BERMUDA SLOPE AND IN THE ADJACENT DEEP SEA.
Final rept.,
by Keith E. Chave, Howard L. Sanders and others.
1 July 62, 17p. illus. tables, 9 refs.
(Contract Nonr-113502) Unclassified report

DESCRIPTORS: *Sedimentation, *Ocean bottom, Animals, Sampling, Algae, Minerals.

AD-286 493 Div. 16
(TISTB/LMH) OTS price $1.60

Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.
HUMAN ADAPTATION TO ANTARCTIC STATION LIFE,
by Paul D. Nelson. June 62, 13p. table, 9 refs.
(Rept. no. 62-12)
Unclassified report

DESCRIPTORS: *Adjustment (Psychology), Ecology, Sensory deprivation, Emotions, Attitudes, Stimulation, Effectiveness, Group dynamics, Correlation techniques, Arctic regions.

Adaptation to the demands of Antarctic station life is considered in terms of an ongoing process of emotional, work, and social adjustment. Research efforts were directed towards developing meaningful and reliable measures of such adaptation for the purpose of comparing individuals and station groups. Effort is yet needed in measuring adaptation as a process rather than as an end state, and greater efforts will be required in future studies of correlates of adaptation. The demographic and personality attributes of station members, the specific work roles of individuals, the group structure, and the demands of the physical environment must be considered relative to one another over time before a more thorough understanding of human adaptation will be achieved. (Author)

AD-286 487 Div. 16
(TISTB/LH) OTS price $1.25

Indiana U., Bloomington.
THE TIME COURSE OF NIGHT AND SPACE MYOPIA.
Report on Aerospace Systems Personnel Protection,
by Gordon G. Heath. Aug 62, 39p. incl. illus. 16 refs.
(Contract AF 33(616)6142, Proj. 6301)
(AMRL TDR 62-80) Unclassified report

DESCRIPTORS: *Eye, *Visual perception, Optical images, Space perception, Retinoscope, Optometry, Optical equipment, Photography, Infrared photography, Test methods.

The refractive state of the human eye was measured over periods up to 4 hours in total darkness and in an empty, lighted visual field, using a subjective optometer, an infrared retinoscope, an infrared automatic recording optometer, and white light and infrared photography of the third Purkinje image. Under both viewing conditions, measurements showed a continuously varying relative myopia produced by accommodative changes, which tended to increase during the first 3-5 minutes and to vary unpredictably thereafter, with continuous, irregular, rapid fluctuations of as much as 0.75 diopter (D.), occasional spontaneous changes of the predominant level by as much as 1 D., and slow drifts of as much as 1.5 D. over periods of several minutes. This highly dynamic accommodative activity in an empty visual field contrasts with previous concepts of a passive and relatively fixed ' resting state' of accommodation under such conditions. Factors influencing this accommodative activity were also studied. (Author)

AD-286 506 Div. 16
(TISTB/MD) OTS price $5.00

National Research Council, Washington, D. C.
TECHNIQUES FOR MEASURING BODY COMPOSITION. PROCEEDINGS OF A CONFERENCE QUARTERMASTER RESEARCH AND ENGINEERING CENTER, NATICK, MASSACHUSETTS JANUARY 22-23, 1959, SPONSORED BY HEADQUARTERS QUARTERMASTER RESEARCH AND ENGINEERING COMMAND U. S. ARMY QUARTERMASTER CORPS AND COMMITTEE ON STRESS PHYSIOLOGY ADVISORY BOARD ON QUARTERMASTER RESEARCH AND DEVELOPMENT DIVISION OF ENGINEERING AND INDUSTRIAL RESEARCH,
ed. by Josef Brozek and Austin Henschel. 1961, 300p. incl. illus. tables, refs.
Unclassified report

DESCRIPTORS: *Biochemistry, *Anthropometry, Body fats, Blood volume, Body surface, Body weight, Muscles, Electrolytes, Bone, Body fluids, Oxygen consumption, Man, Analysis.

Sixteen papers with extensive bibliographies are presented which describe methods for and detailed results from somatometric, volumetric and biochemical studies of body composition.

AD-286 507 Div. 16, 18, 28, 29, 32
(TISTB/MD) OTS price $11.00

National Research Council, Washington, D. C.
MAN LIVING IN THE ARCTIC. PROCEEDINGS OF A CONFERENCE QUARTERMASTER RESEARCH AND ENGINEERING CENTER NATICK, MASSACHUSETTS 1, 2 DECEMBER 1960 SPONSORED BY HEADQUARTERS QUARTERMASTER RESEARCH

AND ENGINEERING COMMAND U. S. ARMY QUARTERMASTER CORPS, THE ARCTIC INSTITUTE OF NORTH AMERICA AND ADVISORY BOARD ON QUARTERMASTER RESEARCH AND DEVELOPMENT DIVISION OF ENGINEERING AND INDUSTRIAL RESEARCH,
ed. by Frank R. Fisher. 1961, 143p. incl. illus. refs.
Unclassified report

DESCRIPTORS: *Arctic regions, *Logistics, *Exposure, *National defense, *Physiology, *Psychology, Protective clothing, Food, Man.

Seventeen papers describing the logistics, strategic importance, physiological, medical, and psychiatric problems, and sociological and political aspects of man living in the arctic, are presented.

AD-286 514 Div. 16
(TISTB/CCH) OTS price $4.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
BIOCHEMICAL MECHANISMS RELATED TO THE HOMEOSTATIC REGULATION OF LIPOGENESIS IN ANIMALS,
by E. J. Masoro. June 62, 46p. 161 refs. (AAL TDR 61-47)
(Proj. 8237-38; In cooperation with Tufts U. School of Medicine, Boston, Mass., Contract AF 41(657)321)
Unclassified report

DESCRIPTORS: *Metabolism, *Fatty acids, *Carboxylases, Biosynthesis, Fats, Enzymes, Starvation, Laboratory animals, Exposure, Endocrine glands.

The physiologic regulation of lipogenesis is discussed. The site of regulation in the enzymatic sequence of fatty acid synthesis appears to be the acetyl CoA carboxylase step. The following have been excluded as having importance in this regulation: (a) intracellular acetyl CoA levels; (b) the rate of TPNH generation; (c) direct actions of hormones. The following mechanisms appear to play a role in the control of lipogenesis: (a) concentration of acetyl CoA carboxylase; (b) lipogenic inhibitors; (c) lipogenic stimulators; (d) the level of tricarboxylic acid intermediates; (e) the concentration of CoA; (f) the level of FFA. Instead of considering the mechanism controlling lipogenesis, it seems more likely that this problem can only be understood by considering the multiple nature of the specific chemical events controlling fatty acid synthesis. (Author)

AD-286 516 Div. 16
(TISTB/LMH) OTS price $2.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS. CRITICAL REVIEW. III. ENVIRONMENTAL STRESS AND BEHAVIOR ECOLOGY,
by J. R. Braun and S. B. Sells. June 62, 23p. 50 refs. (Rept. no. AAL-TDR-62-33)
(Proj. 8243-11; In cooperation with Texas Christian U., Fort Worth. Contract AF 41(657)323)
Unclassified report

DESCRIPTORS: *Medical research, *Ecology, *Stress (Psychology), Arctic regions, Exposure, Separation, Military psychology, Needs, Behavior, Group dynamics, Effectiveness, Motor reactions, Training, Military personnel.

A critical research review of behavioral effects of isolation, cold, and general stress, with particular reference to Aircraft Control and Warning sites in Alaska. Environmental stress does not appear as a major threat to adjustment of troops stationed at Aircraft Control and Warning sites. Human engineering has contributed greatly to the comfortization and control of the environment, and there appears to be a wide difference between conditions of the area and conditions of the specific work and living environment, except in cases of emergency. The possibility of such emergencies may be a threat, but few have occurred. The positive values of motivation, training, and group dynamics (including leadership) as factors which offset the disorganizing effects of environmental stress are pointed out. (Author)

AD-286 519 Div. 16
(TISTB/CCH) OTS price $1.10

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
CHANGES IN THE LEVEL OF THE FATTY ACID SYNTHESIZING ENZYMES DURING STARVATION,
by H. M. Korchak and E. J. Masoro. May 62, 5p. incl. tables, 10 refs. (Rept. no. AAL TDR 61-46)
(Proj. 8237-02; In cooperation with Tufts U. School of Medicine, Boston, Mass., Contract AF 41(657)321)
Unclassified report

DESCRIPTORS: *Metabolism, *Fatty acids, *Enzymes, Starvation, Rats, Laboratory animals, Synthesis.

The activity of acetyl CoA carboxylase is depressed significantly in 24 hours of fasting and markedly by 72 hours of fasting, while the activity of fatty acid synthetase is not significantly depressed in 24 hours of fasting but is depressed at the end of a 72 hour fast. Evidence is presented that indicates changes in the enzyme levels during fasting do not cause the depressed lipogenesis of this condition but are more likely the result of the low rate of lipogenesis initiated by other factors such as the disapearance of lipogenesis stimulators and the appearance of lipogenic inhibitors. (Author)

AD-286 557 Div. 16
(TISTB/MD) OTS price $1.10

Smithsonian Institution, Washington, D. C.
ANATOMY AND TAXONOMY OF HAWAIIAN WOODS.
Final rept.,
by William L. Stern. 1961, 4p.
(Contract Nonr-358600, Proj. NR 107-605)
Unclassified report

DESCRIPTORS: *Hawaii, *Trees, *Histology.

A list of 46 woody plant species from Hawaii for which stained microscope sections were prepared and added to the Smithsonian collection is presented.

AD-286 566 Div. 16, 28
(TISTB/MD) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AFTERIMAGES IN THE VISUAL SYSTEM,
by L. T. Zagorul'ko. 7 Sep 62, 39p. incl. illus. table, refs. (Trans. no. FTD-TT-62-492 Uspekhi Sovremennoy Biologii, 25:2, 231-250, 1948)
Unclassified report

DESCRIPTORS: *Visual afterimages, *Drugs, *Electromagnetic waves, *Rotation, *Pain, Caffeine, Strychnine, Benzedrine sulfate, Ultra high frequency, Microwaves, Sound.

The effect of central nervous system stimulant drugs, ultra high frequency fields, skin pain, sound, vestibular postrotational reactions and secondary light stimuli on visual after images was studied.

AD-286 570 Div. 16
(TISTB/MD) OTS price $4.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NEWS OF THE ACADEMY OF SCIENCES OF THE TURKMEN SSR BIOLOGICAL SCIENCE SERIES (SELECTED ARTICLES).
5 Oct 62, 41p. incl. illus. tables, refs.
(Trans. no. FTD-TT-62-1201 from Izvestiya Akademii Nauk Turkmenskoy SSR, Seriya Biologicheskikh Nauk 3: pp. 52, 52-55, 56-60, 60-62, 62-65, 66-70, 70-73, 1962)
Unclassified report

DESCRIPTORS: *Exposure, *Hyperthermia, *Blood chemistry, *Biochemistry, *Physiology, Electrolytes (Physiology), Blood proteins, Dehydration, Heat tolerance, Laboratory animals, Enzymes, Tissues (Biology), Liver, Blood, Leukocytes, Thyroid, Excision, Heat.

Contents:
The effect of the high temperature of the environment on various physiological and biochemical reactions of an organism, by A. Kh. Babayeva
Variation in the sodium and potassium cation concentration in rabbit blood plasma on overheating, by A. Kh. Babayeva
Variation of the blood serum protein composition upon overheating, by N. N. Stefanovskaya
The effect of thyroidectomy on the tolerance and degree of tissue dehydration in acute overheating, by A. A. Nepesov and Ye. P. Serebryakov
The effect of overheating on succinic dehydrogenase activity in the heart muscle of white rats, by E. L. Perel'man
Leukocytic formula and phagocytic activity of blood leukocytes in hyperthermia, by A. T. Berdyyeva
The effect of overheating on the riboflavin in white rat tissues, by E. L. Perel'man

AD-286 574 Div. 16
(TISTB/SAT) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NEWS OF THE ACADEMY OF SCIENCES USSR, BIOLOGICAL SERIES (SELECTED ARTICLES),
by N. D. Iyerusalimskiy, Ye. M. Yuganov and others. 10 Sep 62, 35p. incl. illus. tables, 3 refs. (Trans. no. FTD-TT-62-1099 from Izvestiya Akademii Nauk SSSR, Seriya Bilogicheskaya 3: pp. 418-429, 455-460, 1962)
Unclassified report

DESCRIPTORS: *Scientific reports, Cells (Biology), Culture media, Laboratory equipment, Growth, Bacteria, Laboratory animals, Physiology, Gravity, USSR.

AD-286 580 Div. 16
(TISTB/MD) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
EFFECT OF X-RAY RADIATION AND PROPHYLACTIC TREATMENT WITH PROPYL GALLATE ON NUCLEIC ACID CONTENT IN RAT ORGANS,
by M. F. Lipkan, V. A. Baraboy, and R. G. Lukashova. 12 Sep 62, 7p. incl. illus. 6 refs.
(Trans. no. FTD-TT-62-918 from Ukrainskiy Biokhimichniy Zhurnal 2:34, pp. 167-175, 1962)
Unclassified report

DESCRIPTORS: *Benzoates, *Nucleic acids, *Radioprotective drugs, *Radiation effects, Propyl radicals, Hydroxides, X-rays, Laboratory animals, Tissues, Liver, Intestine, Spleen, Testes.

X-ray irradiation with a dose of 750 r depresses the nucleic acid (NA) level in the liver, spleen, intestinal mucosa (small intestines) and testicles of white rats. This decrease, which follows a regular pattern, is one of the principal factors responsible for the death of the animals. In surviving rats the NA level is not restored within a period of one month. The reduction of the RNA content in the organs of irradiated rats precedes that of DNA. The restoration also begins with RNA. Curves of the DNA decrease in the organs of irradiated animals correspond to their death curves. Injection of healthy rats with propyl gallate (PG) induces a change in NA content: It is first lowered, then restored. Variations of RNA precede those of DNA. The lowering of the NA level noted on the 3rd day in the liver, spleen and intestinal mucosa of irradiated rats injected with a preventive dose of PG is more marked than the decrease caused by PG or X-ray irradiation acting separately. Propyl gallate stimulates nucleic metabolism in irradiated animals. The effect becomes apparent at late stages following irradiation (on the 7th-30th day). The action results in accelerated, more complete restoration of the normal NA level. This regularity of PG activity is one of the factors related to its protective effect in acute radiation sickness. (Author)

AD-286 630 Div. 16
(TISTB/MD) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE POSSIBILITY OF DEVELOPING AN ANIMAL ORGANISM UNDER CONDITIONS OF AIR NITROGEN SUBSTITUTED BY HELIUM,
by V. V. Boriskin, P. V. Oblapenko and others.
20 Aug 62, 9p. incl. illus. tables, 7 refs.
(Trans. no. FTD-TT-62-1072 from Doklady Akademii Nauk SSSR 143:2, pp. 475-478, 1962)
Unclassified report

DESCRIPTORS: *Helium, *Growth, Chickens, Animals, Embryos, Rare gases, Heat production (Biology).

Studies showed that the development of chick embryos and chicks in an atmosphere in which nitrogen is replaced by helium is possible, but the heat balance of the organism is disturbed due to the high heat conductivity of helium.

AD-286 650 Div. 16
(TISTB/MD) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
PERITONEAL DIALYSIS IN THE TREATMENT OF RENAL FAILURE: I. THE POSTOPERATIVE AND POST-TRAUMATIC GROUP OF PATIENTS,
by Thomas E. Davis. 1962, 19p. incl. illus. tables, 6 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Artificial kidney, *Kidneys, Man, Uremia, Omentum, Pathology.

Nine patients with either postoperative or post-traumatic renal failure are presented. These patients were dialyzed on thirteen occasions by the peritoneal route. There was a significant reduction in the elevated serum potassium and a reversal of the abnormal ECG in four patients. It was also possible to significantly lower the blood urea nitrogen or prevent its rise in addition to controlling or preventing the appearance of the uremic syndrome in the vast majority of patients. Unfortunately, this did not guarantee

survival. Peritoneal dialysis was shown to be efficient in patients who had undergone recent abdominal surgery and that infection was not a problem in these patients. Although overhydration was not a problem in these patients, others were shown in whom pulmonary edema was effectively combated with hyperosmolar dialysis solutions. Complications were few and did not prevent continuance of the procedure. Peritoneal dialysis seems to be particularly suited to the treatment of acute renal failure in the military situation. (Author)

AD-286 657 Div. 16, 4
(TISTM/SJR) OTS price $1.10

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
TRACER STUDIES OF VITAMIN C UTILIZATION IN MEN; METABOLISM OF D-GLUCURONOLACTONE-6-C14, D-GLUCURONIC-6-C14 ACID AND L-ASCORBIC-1-C14 ACID, by E. M. Baker, H. E. Sauberlich and others. 1962, 9p. incl. illus. table, 7 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Biochemistry, *Metabolism, *Ascorbic acid, Carbon, Labeled substances, Tracer studies, Oxalates, Glucuronic acid, Lactones, Urine.

Studies of body composition and the use of C14 isotopes has resulted in a method for stating the actual utilization of ascorbic acid by healthy men. After ingesting a single 20 microcuries quantity of D-glucuronolactone-6-C14, the urine of healthy men contains C14 activity which can be isolated and found in the highly purified phenylhydrazine derivative of ascorbic acid. Such activity is not found following the ingestion of D-Glucuronic-6-C14 acid, indicating that the above lactone, but not its acid, can function as a source of ascorbic acid. In subjects who ingest 20 microcuries of L-ascorbic-1-C14 acid, the daily urinary oxalate arising from metabolism of the labeled ascorbate is subsequently excreted as a constant proportion of the total C14 activity remaining in the body. In 6 men of diverse body weight and degree of fatness, the ascorbate utilization, as expressed in terms of C14 oxalate excretion, occurred at a rate of 0.207 mg/day/kg of fat-free body weight. Rarely, if ever, do adult males exceed 90 kg in lean body mass. Therefore, 18 mg/day intake would match the greatest quantity of ascorbate metabolized by the largest healthy man. (Author)

AD-286 663 Div. 16
(TISTB/AW) OTS price $2.60

Army Research Office, Office of the Chief, Research and Development, Washington, D.C.
COLD INJURY AND COLD ACCLIMATIZATION IN MAN, by T. R. A. Davis and R. J. T. Joy. 1962, 25p. incl. illus. 66 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Exposure, *Shivering, Frostbite, Test methods, Measurement, Physiology, Countermeasures, Military personnel, Laboratory animals, Injuries.

Cold-acclimatization in animals is accompanied by increased resistance to cold injury. The induction of cold acclimatization in man subsequent to natural and artificial exposure to cold is reported. Indices measured were oxygen consumption, skin and rectal temperatures, and shivering. In all cases shivering was decreased or extinguished by the cold exposure. Oxygen consumption decreased only in those subjects who could be presumed to be minimally acclimatized. Skin temperatures were unaffected or only minimally affected. Rectal temperature decreased only if the cold exposure was sufficiently severe. These changes once produced were not reversed by heat acclimatization and were well retained depending on the degree of cold acclimatization achieved. The demonstration of a physiological cold acclimatization in man suggests the possibility of its use as a protective mechanism in human cold injury. (Author)

AD-286 744 Div. 16
(TISTB/MD) OTS price $13.00

Linde Co., Div. of Union Carbide Corp., New York.
RESEARCH ON PROCEDURES FOR THE LOW-TEMPERATURE PRESERVATION OF BLOOD.
Progress rept.,
by A. P. Rinfret. 25 Apr 60, 170p. incl. illus. tables, 26 refs.
(Contract Nonr-300300)
Unclassified report

DESCRIPTORS: *Blood, *Erythrocytes, Low-temperature research, Additives, Electrolytes, Temperature, Enzymes, Labeled substances, Analysis, Man, Rabbits, Containers, Design, Freezing, Heat transfer, Liquefied gases, Nitrogen, Viability, Preservation, Survival.

Blood can be rapidly frozen and thawed in bulk with red cell recovery above 90%. Protective additives such as glycerol, glucose, lactose, or polyvinylpyrrolidone (PVP) must be combined with blood to obtain such recovery. Red cell recovery is a function of the rate at which heat is transferred to or from the blood specimen. The nature of the additive combined with blood influences the requirement for heat transfer to achieve high red cell recovery. Thus, an additive which penetrates the cell, such as glycerol, requires slow cooling (0.3 C per second) in an isotonic medium to obtain highest red cell recovery. Extracellular additives such as lactose (22%) and polyvinylpyrrolidone (10%) require faster cooling rates (30 C per second) to obtain high recovery. Anions affect red cell recovery in a freeze-thaw procedure (using lactose as protective additive) in a sequence indicating a Hofmeister svries. An assay for red cell viability in rabbits was developed. Aluminum containers were designed which permit efficient heat transfer through blood volumes up to 600 ml. (Author)

AD-286 745 Div. 16
(TISTB/MD) OTS price $4.60

Linde Co., Div. of Union Carbide Corp., New York.
RESEARCH ON PROCEDURES FOR THE LOW-TEMPERATURE PRESERVATION OF BLOOD. II. IN VIVO DETERMINATION OF RED CELL SURVIVAL IN RABBITS USING CONSECUTIVE TAGGING WITH CHROMIUM-51.
Progress rept.,
by A. P. Rinfret. 1 July 60, 37p. incl. illus. tables, 15 refs.
(Contract Nonr-300300)
Unclassified report

DESCRIPTORS: *Blood, *Erythrocytes, Rabbits, Test methods, Labeled substances, Chromium compounds, Radioactive isotopes, Low temperature research, Additives, Temperature, Freezing, Viability, Preservation, Survival.

Procedures are described for assaying the in

vivo viability of rabbit erythrocytes using a radioactive label, Cr(51). The assay procedure was examined for sources of error. Rabbit blood stored at 4 C and specimens treated with various additives and frozen and thawed by various procedures were assayed for viability by the method of consecutive tagging. Rabbit blood stored for six months at two temperatures, -78 and -196 C was also tested for red cell recovery and assayed for viability by the method of consecutive tagging. Recovery of erythrocytes averaged more than 30% lower in the specimens stored at the higher temperature. Survival of the remaining intact cells averaged 12% lower in these specimens than in those stored at -196 C. (Author)

AD-286 746 Div. 16
(TISTB/MD) OTS price $6.60

Linde Co., Div. of Union Carbide Corp., New York.
RESEARCH ON PROCEDURES FOR THE LOW-TEMPERATURE PRESERVATION OF BLOOD. III. ENGINEERING AND BIOLOGICAL FACTORS IN THE DEVELOPMENT OF A PROCESS TO PRESERVE BLOOD BY FREEZING AND THAWING.
Progress rept.,
by A. P. Rinfret. 15 Dec 60, 57p. incl. illus. tables.
(Contract Nonr-300300)
Unclassified report

DESCRIPTORS: *Blood, *Erythrocytes, *Containers, Low temperature research, Additives, Glucose, Temperature, Freezing, Viability, Design, Preservation, Survival.

Studies designed to provide apparatus and processing methodology pertaining to engineering and biological factors which will permit the experimental freezing and thawing of blood under controlled and reproducible conditions are described. In particular, work on blood container development and the conditions necessary to obtain high red cell recovery with glucose as the protective additive are considered. A procedure was developed for rapidly freezing and thawing whole human blood containing a final concentration of 12.5% glucose in unit quantities up to 600 cc. Red cell recovery values (i.e. the percentage of cells containing intact complements of hemoglobin immediately after thawing, on the assumption that free hemoglobin arises only from totally destroyed cells) between 93 and 95% can be obtained routinely. (Author)

AD-286 747 Div. 16
(TISTB/MD) OTS price $1.10

Linde Co., Div. of Union Carbide Corp., New York.
RESEARCH ON PROCEDURES FOR THE LOW-TEMPERATURE PRESERVATION OF BLOOD. IV. INSTALLATION OF PROCESSING CENTER FOR EXPERIMENTAL FREEZING AND THAWING OF BLOOD AT THE BUFFALO GENERAL HOSPITAL.
Progress rept.,
by A. P. Rinfret. 15 Dec 60, 6p. incl. illus.
(Contract Nonr-300300)
Unclassified report

DESCRIPTORS: *Blood, *Medical equipment, Processing, Hospitals, Liquefied gases, Nitrogen, Blood transfusions, Man, Freezing, Design, Installation, Preservation.

The physical arrangement and function of the various units of equipment of an experimental low temperature blood processing center in a hospital, designed to freeze and thaw blood in quantities suitable for human transfusion, is described.

AD-286 748 Div. 16
(TISTB/MD) OTS price $4.60

Linde Co., Div. of Union Carbide Corp., New York.
RESEARCH ON PROCEDURES FOR THE LOW-TEMPERATURE PRESERVATION OF BLOOD. V. RED CELL VIABILITY STUDIES IN MAN AND RABBITS USING BLOOD FROZEN WITH GLUCOSE AND LACTOSE-GLUCOSE AS PROTECTIVE ADDITIVES.
Progress rept.,
by A. P. Rinfret. 1 Apr 61, 40p. incl. illus. tables, 9 refs.
(Contract Nonr-300300)
Unclassified report

DESCRIPTORS: *Blood, *Erythrocytes, Lactose, Glucose, Additives, Low temperature research, Freezing, Man, Rabbits, Blood transfusions, Labeled substances, Viability, Blood volume, Preservation, Survival.

The viability of human erythrocytes preserved by rapid freezing and thawing was assayed by procedures including an independent measure of blood volume. The viability of glucose-treated erythrocytes appears to be related to the amount of additive used and the time it remains in liquid state contact with the cells before freezing. Longer periods of equilibration, while yielding higher red cell recovery following thawing, resulted in heavy osmotic destruction of cells on reaching the recipients' circulation. Rabbit erythrocytes treated with glucose additive showed poorer recovery following thawing than did human red cells. (Author)

AD-286 749 Div. 16
(TISTB/MD) OTS price $3.60

Linde Co., Div. of Union Carbide Corp., New York.
RESEARCH ON PROCEDURES FOR THE LOW-TEMPERATURE PRESERVATION OF BLOOD. VI. A BASIC ENGINEERING STUDY OF THE FREEZING AND THAWING PROCESS.
Progress rept.,
by A. P. Rinfret. 1 Apr 62, 33p. incl. illus.
(Contract Nonr-300300)
Unclassified report

DESCRIPTORS: *Blood, *Freezing, *Containers, Heat transfer, Low temperature research, Temperature, Liquefied gases, Nitrogen, Hemolysis, Erythrocytes, Survival, Additives, Viability, Preservation, Time, Design.

The freezing and thawing of water and blood in closed containers under conditions similar to those currently employed in processing blood is examined. The examination involved (1) the use of transparent containers, as well as containers with removable covers from which the frozen contents could be removed for visual examination; (2) measurement of the relative amounts of liquid and solid at various times during processing; and (3) the use of thermocouples positioned in the containers. These observations permit a detailed description to be made of the events occurring inside the container during freezing and thawing. This information has guided the development of blood processing equipment and techniques, and is gradually building up a background for subsequent mathematical analysis of the heat transfer problem involved. Some possible modifications to the type of agitation used during freezing are discussed briefly. These modifications, which reduce turbulence in the liquid being cooled, have possible advantages such as simplification of the type of equipment required. (Author)

AD-286 750 Div. 16
(TISTB/MD) OTS price $4.60

Linde Co., Div. of Union Carbide Corp., New York.
RESEARCH ON PROCEDURES FOR THE LOW-TEMPERATURE PRESERVATION OF BLOOD. VII. DESIGN AND DEVELOPMENT OF AN INTEGRATED UNIT FOR PROCESSING BLOOD

AT LOW TEMPERATURES - MODEL BPU-1.
Progress rept.,
by A. P. Rinfret. 1 Apr 61, 41p. incl. illus.
(Contract Nonr-300300)
Unclassified report

DESCRIPTORS: *Blood, *Medical equipment, Man, Freezing, Liquefied gases, Nitrogen, Temperature, Operation, Construction, Preservation, Design.

The design and development of a blood processing unit from its conception through the phases of design, construction and subsequent successful operation are described. BPU-1, an abbreviation of the first letters of Blood Processing Unit - Model 1, was designed as a research tool, but its operation was automated so as to permit foolproof operation by semi-skilled technicians in clinical applications. All phases of the processing may be varied to allow for changes in blood preservation technique that may develop in the future. Shaking is provided by a heavy-duty, custom-made, wrist-action agitator. Injection and withdrawal of blood containers from the freezing and thawing baths is accomplished by pneumatic cylinders. Containers are held on the agitator arms with simple, spring-loaded clamps. All phases of the processing -- equilibration, coating, freezing, thawing, and interim storage -- are integrated into BPU-1. The machine is self-contained, simple to operate, flexible and reliable. (Author)

AD-286 751 Div. 16
(TISTB/MD) OTS price $7.60

Linde Co., Div. of Union Carbide Corp., New York.
RESEARCH ON PROCEDURES FOR THE LOW-TEMPERATURE PRESERVATION OF BLOOD. VIII. RED CELL DAMAGE AND PROTECTION DURING FREEZING AND THAWING: A BASIC BIOLOGICAL AND CHEMICAL STUDY OF MECHANISMS.
Progress rept.,
by A. P. Rinfret. 1 July 61, 76p. incl. illus. tables, refs.
(Contract Nonr-300300)
Unclassified report

DESCRIPTORS: *Blood, *Erythrocyte, *Freezing, Additives, Saccharides, Alcohols, Amino acids, Peptides, Electrolytes, Polymers, Dextran, Man, Viability, Glycols, Temperature, Enzymes, Cholinesterase, Phosphatases, Biochemistry, Low-temperature research, Survival, Dehydration, Preservation, Hemolysis.

Many compounds, including sugars, glycols, and polymers, at concentrations of 5 to 15% w/v inhibit the hemolysis of red cells by freezing and thawing when rapid rates of cooling and warming, of the order of several degrees or more per second, are employed. Protective activity correlates with the concentration of potential hydrogen bonding groups provided by the solutes. Red cells appear to hemolyze during freezing and thawing by a sequence of events involving a loss of enzymes associated with cation transport, an increase in electrolyte permeability, and a net uptake of water under an osmotic pressure gradient dependent on intracellular hemoglobin concentration. Freezing and thawing releases and activates adenosine triphosphatase and releases cholinesterase. Recovered frozen and thawed red cells exhibited additional hemolysis upon resuspension in electrolyte solutions; this was largely inhibited in sucrose solution and completely prevented in polymer solutions of sufficient concentrations. (Author)

AD-286 752 Div. 16
(TISTB/MD) OTS price $4.60

Linde Co., Div. of Union Carbide Corp., New York.
RESEARCH ON PROCEDURES FOR THE LOW-TEMPERATURE PRESERVATION OF BLOOD. IX. STUDY OF METHODS FOR THE DETERMINATION OF IN VIVO SURVIVAL OF PRESERVED RED CELLS.
Progress rept.,
by A. P. Rinfret. 1 Aug 61, 40p. incl. illus. tables, refs.
(Contract Nonr-300300)
Unclassified report

DESCRIPTORS: *Blood, *Erythrocytes, *Labeled substances, Chromium compounds, Phosphorus compounds, Radioactive isotopes, Rabbits, Freezing, Viability, Preservation, Survival, Test methods.

A new method which meets both theoretical and practical criteria for assaying red cell survival of frozen and thawed blood was developed. An injection of chromium-51 labeled autologous red cells is made into a test animal followed by sampling of the peripheral blood for specific red cell radioactivity. A subsequent injection of preserved red cells, also labeled with chromium-51 but at a 10-fold higher level of radioactivity, is made into the same animal followed again by sampling of the peripheral blood for specific red cell radioactivity. The degrees of dilution of the two injections of chromium-51 are compared. A detailed procedure and the derivation of an equation for calculating red cell survival are included. Comparison of our own and the work of others with respect to red cell survival of preserved red cells in rabbits and man has indicated the validity of using rabbits in testing blood preservation methods. (Author)

AD-286 754 Div. 16
(TISTB/MD) OTS price $10.10

Linde Co., Div. of Union Carbide Corp., New York.
RESEARCH ON PROCEDURES FOR THE LOW-TEMPERATURE PRESERVATION OF BLOOD. XI. DEVELOPMENT AND CLINICAL EVALUATION OF PROCESSES FOR THE LOW TEMPERATURE PRESERVATION OF BLOOD BASED ON RAPID COOLING AND WARMING AND PROTECTION BY POLYMERS.
Progress rept., Feb 61-June 62,
by A. P. Rinfret. 1 July 62, 118p. incl. illus. tables, 11 refs.
(Contract Nonr-300300)
Unclassified report

DESCRIPTORS: *Blood *Erythrocytes, *Freezing, Viability, Blood transfusion, Rabbits, Man, Chromium compounds, Labeled substance, Radioactive isotopes, Additives, Polymers, Vinylpyrrolidone, Low temperature research, Preservation, Survival.

Four basic processes for low temperature blood preservation were formulated and evaluated at a laboratory level and in animal and human transfusions. Process I involves separating the red cells from blood by conventional centrifugation, resuspending the red cells and freezing in a polymer-containing medium, and after thawing resuspending the cells in their plasma for transfusion. Polyvinylpyrrolidone (PVP) was studied extensively in this process. Process II involves freezing the red cell fraction of blood in the presence of part or all of the plasma combined with polymeric additives. Process III involves freezing whole blood collected into or combined after collection with polyvinylpyrrolidone at a concentration of about 7% w/v. At this concentration of PVP quantities of frozen blood up to 400 ml were transfused to human recipients without post-thaw processing of any kind. No adverse

clinical effects were observed. Process IV involves freezing the red cell fraction of blood in the presence of a small volume (about 25% of the cell volume) of polyvinylpyrrolidone-plasma or human serum albumin. (Author)

AD-286 799 Div. 16, 20
(TISTB/CCH) OTS price $1.10

Western Biological Labs., Culver City, Calif.
LESIONS IN THE ORAL TISSUES INDUCED BY EXPOSURE TO MULTIPLE SUBLETHAL DOSES OF TOTAL BODY X-IRRADIATION IN THE MOUSE AND THE EFFECTS OF DIETARY SUPPLEMENTS OF BIOFLAVONOIDS THEREON.
Final technical rept., 1 Nov 61-31 Oct 62, by Benjamin H. Ershoff. 31 Oct 62, 8p. incl. illus. 4 refs.
(Contract DA 49-193-md-2210)
Unclassified report

DESCRIPTORS: *Mouth, *Radiation effects, Laboratory animals, Mice, Tissue (Biology), Metabolism, Food, Dose rate, Histology, Gingivitis, Diet, X-rays, Pathology, Radiation injuries.

The effects of multiple sublethal doses of total body x-irradiation were determined on the oral tissues of mice fed a highly purified basal ration and the basal ration plus supplements of bioflavonoids of diverse structure and physicochemical properties. Similar lesions were observed in all x-irradiated mice with no significant differences between the various dietary groups. The lesions observed include rarefaction, collagenolysis, pyknosis, canalization with capillaries, and inclusions of squamous epithelium and osteoclasts of the periodontium; focal resorption of the acellular cementum; osteoclastic inclusions in the dentin; acute gingivitis and interdental pyorrhea; decreased trabiculation and bone marrow of the alveolar bone; and neoplastic changes of the lacrimal gland, submaxillary salivary gland and squamous epithelium. Lesions comparable to the above were not observed in non-irradiated mice in the various dietary groups. (Author)

17. METALLURGY

AD-285 676 Div. 17,
(TISTM/ODN) OTS price $4.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
PREPARATION AND EVALUATION OF HIGH PURITY BERYLLIUM.
Quarterly progress rept., 2 Apr-1 July 62, by G. E. Spangler, M. Herman and others. 1 July 62, 39p. incl. illus. 11 refs. (Rept. no. Q-B1933-3)
(Contract NOw 62-0536-d)
Unclassified report

DESCRIPTORS: *Beryllium, *Zone melting, *Electron microscopy, *Foils, Mechanical properties, Tensile properties, Tests, Crystals, Shear stresses, Deformation, Diffusion, Fracture (Mechanics), Single crystals, Grains (Metallurgy), Resistance, Low temperature research, Purification.

Contents:
Zone refining
Mechanical testing
  Tensile tests
  Compression tests
Polycrystalline zone melted beryllium
  Hot rolling
  Texture studies
Electron transmission microscopy
  Basal glide
  Prism glide
  Cross slip
Eddy currents
  Apparatus
  Experimental results
Self-diffusion in beryllium

AD-285 677 Div. 17, 22
(TISTM/TCG) OTS price $4.60

Pitman-Dunn Labs. Group, Frankford Arsenal, Philadelphia, Pa.
FRACTURE TOUGHNESS OF HIGH STRENGTH STEELS FOR RECOILLESS RIFLES,
by C. M. Carman and J. H. Mulherin. July 62, 52p. incl. illus. tables, 5 refs. (Rept. no. R-1648)
(Proj. 5S02-01-008)
Unclassified report

DESCRIPTORS: *Steel, *Stainless steel, *Recoilless rifles, Fracture (Mechanics), Crazing, Theory, Mathematical analysis, Test methods, Martensite, Mechanical properties.

The mathematical model used to apply the fracture mechanics approach to crack propagation fracture toughness is described. Fracture toughness data were obtained for 410 stainless steel, 4330V (Mod + Si) steel, AMS6434 steel, AMS6434 CEVM steel, 300M steel, H11 steel, Ladish D6Ac steel, Airsteel X200, and AM350 CRT steel. These data are interpreted in terms of the basic short-crack model in which general yielding precedes fracture. A minimum fracture toughness requirement of beta=2 pi is proposed. It is concluded that: The fracture mechanics approach combined with a minimum fracture toughness requirement permits a reasonable and quantitative evaluation of steels for recoilless rifle service; Use of the basic short-crack model to predict behavior of materials in recoilless rifle service is appropriate with only small defects present; Steels investigated, including 4330V (Mod + Si), having yield strengths of 220,000 psi or less meet the fracture toughness requirement of beta=2 pi; and Both specimen geometries are adequate to detect embrittlement in steels, but the one inch wide edge notched specimen is too narrow to accurately determine the fracture toughness of most materials. (Author)

AD-285 681 Div. 17
(TISTM/TCG) OTS price $5.60

Massachusetts Inst. of Tech., Cambridge.
INVESTIGATION OF SOLIDIFICATION OF HIGH STRENGTH STEEL CASTINGS.
Interim rept., 9 June-8 Dec 61.
Feb 62, 34p. illus. 39 refs.
(Contract DA 19-020-ORD-5443, Proj. 59332007)
(WAL TR 311/49) Unclassified report

DESCRIPTORS: *Cast steel, *Heat resistant alloys, *Crystallization, Solids, Reaction kinetics, Melting, Heat treatment, Controlled atmospheres, Casting, Nickel alloys, Chromium alloys, Steel, Physical properties.

Results are presented of a continuing research program on solidification of high strength cast steel. Exploratory experiments were conducted and apparatus assembled to permit solidification at controlled rates of cooling of small samples of steel or lower melting point materials; these experiments can be carried out under controlled atmosphere. The apparatus permits solidifying samples at rates from approximately 500 to less than 0.005 F per minute. Dendrite arm spacing in steel is shown to be dependent on both cooling rate and alloy analysis. For example, in a low alloy steel, spacing is 900 microns at a cooling rate of 0.43 F per minute during solidification; spacing is 260 microns at a cooling rate of 19.2 F per minute. In a more highly alloyed nickel-chromium steel, dendrite spacing is less than 85 microns over a comparable range of cooling rates. Dendrite arm spacing is the primary structural factor in castings and ingots affecting efficiency of homogenizing treatments. (Author)

AD-285 810 Div. 17, 26
(TISTM/EJH) OTS price $1.50

Armour Research Foundation, Chicago, Ill.
DEVELOPMENT OF PARTIALLY VOLATILE BRAZING FILLER ALLOYS FOR HIGH-TEMPERATURE APPLICATION AND RESISTANCE TO OXIDATION.
Final rept., 15 Mar 61-14 Mar 62 on Metallic Materials,
by Nikolajs Bredzs, John F. Rudy, and Harry Schwartzbart. July 62, 45p. incl. illus. tables, 9 refs.
(Contract AF 33(616)6882, Proj. 7351)
(WADC TR 59-404, pt. 3) Unclassified report

DESCRIPTORS: *Brazing, *Soldering alloys, *Nickel alloys, Indium alloys, Aluminum alloys, Chromium alloys, Silicon alloys, Iron alloys, Germanium alloys, Stainless steel, Metal joints, Cobalt alloys, Lead alloys, Lithium alloys, Boron alloys, Wetting agents, Melting, Vapor pressure, Thermodynamics, Oxidation, High temperature research.

It was shown thermodynamically and confirmed experimentally that a high vapor pressure constituent of a given filler metal can be volatilized in a shorter time, at a lower temperature, or to a greater extent, if to the given filler metal other constituents are added, which have a larger free energy of solution in the given filler metal than the volatile constituent. Specifically, it was experimentally demonstrated that additions of aluminum, chromium, silicon, and to a lesser extent iron and germanium, increase the rate of volatilization of indium from nickel. This order of effectiveness confirms,

according to available thermochemical data, the above hypothesis. The effects of the joint geometry on the ability to volatilize are discussed. Limitations on joint depth must be recognized if appreciable volatilization is to be obtained within reasonable times at temperature. (Author)

AD-285 951 Div. 17
(TISTM/EJH) OTS price $1.60

Bell Aerosystems Co., Buffalo, N. Y.
THE DEVELOPMENT OF COATED THIN SHEET SUPERALLOY COMPONENTS.
Quarterly progress rept. no. 1, 25 June-1 Oct 62, by E. J. King and E. A. Dolega. 15 Oct 62, 15p. incl. tables (Rept. no. D2121-933001)
(Contract AF 33(657)8797)
Unclassified report

DESCRIPTORS: *Nickel alloys, *Cobalt alloys, *Heat resistant alloys, *Refractory coatings, *Metal coatings, Sheets, Chromium alloys, High temperature research, Oxidation inhibition, Chromium plating, Nickel plating, Ceramic coatings, Aluminum coatings, Tungsten alloys, Refractory materials, Manufacturing methods.

This investigation is being conducted to determine the processes and techniques required to produce reliable coated superalloy structural components. The effects of exposures on coated components at temperatures of 2000, 2100, and 2400 F will be evaluated. (Author)

AD-285 953 Div. 17, 26
(TISTM/EJH) OTS price $1.60

Armour Research Foundation, Chicago, Ill.
DEVELOPMENT AND APPLICATION OF A THEORY FOR PLASTIC DEFORMATION OF CEMENTED ALLOYS. TASK 1. ZONE REFINING OF CEMENTED TUNGSTEN-BASE ALLOYS.
Quarterly rept. no. 4, 1 Jan-31 Mar 62, by N. M. Parikh. 27 Apr 62, 12p. incl. illus.
(Contract DA 11-022-505-ORD-3092, Proj. 5B93-32-002)
Unclassified report

DESCRIPTORS: *Tungsten, *Tungsten alloys, *Sheets, Powder metallurgy, Nickel alloys, Iron alloys, Powder alloys, Rolling mills, Sintering, Zone melting, Heat treatment, Manufacturing methods, Porosity, Microstructure, Plastic flow, Deformation, Mechanical properties.

Experiments were made to scale up the current effort for production of large W sheets. Two 100 lb blocks of W-Ni-Fe powder were prepared by pressing in a die several sintered slabs (6 in. x 4 in. x 1 in.). The details of further processing are discussed in this report. The 'inhomogeneity' problem in powder mixing of W-Ni-Fe powder was solved. The course of difficulty in rolling slabs with uniform composition was found to be the porosity distribution and high oxygen content. The sintering practice followed to date worked satisfactorily for thin samples. However, when thick samples were sintered, the outer surface of the samples was sintered and densified, thereby making it difficult to reduce the gases from the interior. This problem was eliminated by preheating or stoking the samples. (Author)

AD-285 964 Div. 17
(TISTM/ODN) OTS price $.75

Naval Research Lab., Washington, D. C.
TENSILE PROPERTIES OF EXPLOSIVELY FORMED MILD-STEEL PLATE,
by E. A. Lange, T. W. Crooker and E. P. Klier. 18 Sep 62, 22p. incl. illus. tables, 8 refs.
(NRL rept. no. 5819)
Unclassified report

DESCRIPTORS: *Steel, *Metals, Metal plates, Mechanical properties, Measurement, Stresses, Tensile properties, Explosive forming.

The strains produced by the explosive forming of a metal plate result from dynamic body loads. In the present investigation four samples of 1/2-inch-thick mild-steel plate were explosively formed through a central-hole die into circular bulges. Specimens from the bulge, the die-edge region, and the plate edge were taken from each plate, and stress-strain relationships were determined from these specimens. At all locations on each plate, the increase in both yield strength and tensile strength is significant. The explosively induced strain has a greater effect on yield strength than on nominal tensile strength, the maximum potential increases being approximately 100 to 50%. The forming strain at these maximum levels of strength causes only a 30% decrease in the reduction in area. For the mild-steel plates used in this investigation, high values of forming strains increased the nominal tensile strength from 50,000 psi to 75,000 psi. It was found that the terminal strain from explosive loading is equal to the terminal strain in a conventional tensile test. Also, residual macrostresses in explosively formed mild steel are nil. (Author)

AD-286 056 Div. 17
(TISTM/ODN) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
STATIC FATIGUE FRACTURING OF HIGH PRESSURE GAS VESSELS,
by F. R. Larson. 1962, 15p. incl. illus. tables, 7 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962 at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Pressure vessels, *Fracture (Mechanics), *Fatigue (Mechanics), *Gases, Corrosion, Stresses, Hydrogen, Tests, Brittle materials, Failure (Mechanics).

The problem of delayed failures of service components is briefly reviewed. Several mechanisms are discussed in light of crack propagation and fracture mechanics. Differences in behavior patterns for high toughness and low toughness materials in relation to crack-like flaws and load carrying ability are illustrated. The stress corrosion or hydrogen embrittlement aided slow crack propagation to the fracture boundary for these two cases is explained. The application of these principals to the solution of a practical service failure problem is discussed in detail. Recommendations for the elimination of these types of failures are included along with an example of the successful solution of a typical problem. (Author)

AD-286 074 Div. 17, 26
(TISTM/EJH) OTS price $3.60

General Dynamics/Fort Worth, Tex.
WING - ALUMINUM SHEET AND PLATE - DYNAMIC ETCHED OR CHEM-MILLED - MECHANICAL PROPERTIES -

DETERMINATION OF,
by H. B. Farner, 10 Sep 62, 38p. incl. illus.
(Rept. no. FGT-2100)
(Contracts AF 33(600)32841 and AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Aluminum alloys, *Chemical milling, Tensile properties, Mechanical properties, Fatigue (Mechanics), Sheets, Metal plates, Test methods, Surfaces, Processing, Thickness.

The effect of chemical milling on mechanical properties of 2024, 7075, 7079 Al alloys was determined. The tensile strengths were affected as follows: All the 0.064 in. gage 2024-T86 alclad aluminum showed strength losses. Bare 1.50 in. gage 7075-T6 and 7079-T6 aluminum plate, showed strengths approximately 10% below the strength of the control specimens. There was no significant change in the mecahnical properties when the 0.125 in. thick alclad 2024-T86 was reduced to 0.098 in. thickness, the 0.312 in. thick 2024-T86 and 7075-T6 were reduced to 0.098 in. thickness, the 1-1/2 in. thick 7075-T6 was reduced to 0.030 in. thickness, or the 1-1/2 in. thick 7079-T6 in the longitudinal direction was reduced to 0.030 in. thickness. The 7079-T6 in the transverse direction showed a loss in yield strength of about 10%. The 0.312 in. thick 2024-T86 plate reduced to 0.015 in. thickness, showed a loss of approximately 6% in yield and ultimate strengths in the transverse direction. Generally, all the materials showed some loss of ductility. (Author)

AD-286 233 Div. 17, 14, 13
(TISTM/TCC) OTS price $1.60

General Dynamics/Fort Worth, Tex.
MATERIAL - BRAZED HONEYCOMB PANELS - STRUCTURAL REPAIRS - EVALUATION OF,
by W. M. Pratt. 26 July 62, 13p. incl. illus. tables (Rept. no. FGT-2869)
(Contracts AF 33(600)36200 and AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Stainless steel, *Sandwich panels, *Honeycomb cores, Brazing, Maintenance, Spot welding, Spot welds, Mechanical properties.

Various methods of structural repair for brazed stainless steel sandwich panels were evaluated. Three new types of repair were investigated. Basically, these types of repair involved the attachment of patches over damaged areas with TIG fusion spot welds. The center of the patches were further supported with a heliarc spot welded pin, Hi Lok fastener or threaded plug. The evaluation of the tentative repair techniques was divided into two phases. Phase A, which is reported in this publication, consisted of edge compression tests on control, damaged, and repaired panels. Phase B consisted of sonic testing of panels repaired by the most promising technique established from the Phase A results. (Author)

AD-286 234 Div. 17
(TISTM/EJH) OTS price $1.10

General Dynamics/Fort Worth, Tex.
HYDRAULICS - MODIFIED 6Al-4V CAST TITANIUM ALLOY MECHANICAL PROPERTIES OF - DETERMINATION OF,
by S. V. Glorioso. 26 July 62, 9p. incl. illus. tables (Rept. no. FTDM-2654)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Titanium alloys, Aluminum alloys, Vanadium alloys, Tensile properties, Hardness, Impact shock, Creep, Chemical analysis, Chromium alloys, Molybdenum alloys, Test methods, Mechanical properties.

Mechanical properties and chemical composition of 8 cast test specimens of modified 6Al-4V titanium alloy were investigated. Hardness, tensile, notch tensile and impact data are presented in tabular form. Chemical analysis indicated that the standard composition for 6Al-4V Ti was modified by additions of chromium and molybdenum. Creep tests indicated that at room temperature and 325 F some creep occurred in the first 100 hours, and this first stage creep accounted for the total creep deformation. No detectable second stage creep occurred. (Author)

AD-286 236 Div. 17
(TISTM/ODN) OTS price $1.10

General Dynamics/Fort Worth, Tex.
MATERIAL - 4340 (260-292 KSI) PHOSPHATIZED - HYDROGEN EMBRITTLEMENT - STUDIES OF,
by W. M. Pratt. 6 July 62, 4p. incl. illus. table (Rept. no. FTDM-2740)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Steel, *Hydrogen, Heat treatment, Coatings, Phosphates, Solutions, Tests, Tensile strength.

The object of this study was to determine whether a newly proposed phosphating treatment would cause H2 embrittlement of 4340 steel heat treated to 260-292 ksi ultimate tensile strength. Loads for the static loading tests were calculated on a percentage basis from the average notched tensile strength values. Microscopic examination revealed a heavier coating on the specimens treated with the 60 point solution for 5 minutes than on those treated with the 12.5 point solution for 20 minutes. (Author)

AD-286 238 Div. 17
(TISTM/TCG) OTS price $1.60

General Dynamics/Fort Worth, Tex.
MATERIAL, 2024-T86 ALUMINUM ALLOY, FATIGUE TEST OF - AT ROOM TEMPERATURE AND AT 300F AFTER 6707 HOURS SOAK AT 325F,
by John F. Hildebrand. 2 May 62, 10p. incl. illus. tables (Rept. no. FTDM-2852)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Aluminum alloys, *Sheets, Tensile properties, Fatigue (Mechanics), High temperature research, Heat treatment, Mechanical properties.

The effect of prolonged exposure at elevated temperature on the fatigue strength of Al alloy was determined. The fatigue life of 2024-T86 material at room temperature and 300F was not significantly shortened by exposure at 325F for 6707 hr. (Author)

AD-286 239 Div. 17
(TISTM/TCG) OTS price $1.10

General Dynamics/Fort Worth, Tex.
MATERIAL, 2024-T86 ALUMINUM ALLOY - INFLUENCE OF OVERAGING ON CORROSION RESISTANCE OF,

by John F. Hildebrand. 26 July 62, 2p. incl. table (Rept. no. FTDM-2851)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Aluminum alloys, *Corrosion-resistant alloys, Alloys, Corrosion research, Heat treatment, Aging, Corrosion inhibition.

AD-286 245 Div. 17
(TISTM/ODN) OTS price $1.10

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
THE USE OF RADIOACTIVE INDICATORS IN STUDYING THE INHIBITION OF CORROSION CAUSED BY A CURRENT SUPERIMPOSED FROM THE OUTSIDE,
by A. I. Levin and V. I. Falicheva. June 62, 10p. incl. illus. table, 10 refs. (Technical notes no. FRL-TN-123; Trans. by U. S. Joint Publication Research Service from Nauchnye Doklady Vysshei Shkoly. Khimiia i Khimicheskaia Tekhnologiia. No. 1:32-35, 1958)
Unclassified report

DESCRIPTORS: *Zinc, *Corrosion, *Radioactive isotopes, *Corrosion inhibition, Metals, Bibliography, Ions, Electrodes, Zinc electrodes, Hydrogen, Electric currents.

A sufficiently complete theory of the protective potential still does not exist. How, experimental data given for Zn attest that the protective action of current superimposed from the outside is undoubtedly related to the creation of a barrier, which retains the ions of Zn in a double electric layer. The process of self-dissolving of the metal damps at the same time. In this case, the precipitation of H on the Zn cathode cannot be explained by the corrosion of the metal already settled on the cathode. The generation of gas is the primary electrode reaction, i.e., it depends only on the rate of interaction of the ions of H with the electrons. (Author)

AD-286 280 Div. 17
(TISTM/ODN) OTS price $1.60

General Dynamics/Fort Worth, Tex.
EFFECTS OF PLASTIC DEFORMATION ON TENSILE TEST SPECIMENS BY VARIATIONS IN THE STRAINING RATE,
by S. V. Glorioso. 28 Sep 62, 12p. incl. illus. tables (Rept. no. FGT-1824)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Alloys, *Aluminum alloys, *Magnesium alloys, *Steel, Elasticity, Plasticity, Heat treatment, Materials, Tests, Mechanical properties, Deformation, Tensile properties.

The effect of strain rate in the plastic range on the percent elongation, percent reduction of area, and the rise in specimen temperature due to straining 5052-0 Al alloy, AZ80A Mg alloy and annealed SAE 4130 steel was determined. Eleven specimens of SAE 4130 steel which were heat treated to approximately 200,000 psi were also tensile tested at various strain rates to determine how the rise in temperature due to straining compared with the annealed SAE 4130 steel specimens. It was found that strain rate in the plastic range had no significant effect on the percent elongation or percent reduction of area properties of the materials tested. The increase in temperature due to increased strain rates was greater for the SAE 4130 steel heat treated to 200,000 psi than for the annealed 4130 steel, but in neither case did it significantly affect the percent elongation or percent reduction of area properties. (Author)

AD-286 281 Div. 17
(TISTM/EJH) OTS price $3.60

General Dynamics/Fort Worth, Tex.
MATERIALS - 4340 STEEL - STRESS CORROSION AND EFFECTS OF BANDING LITERATURE SURVEY, PART I. STRESS CORROSION,
by H. P. Owen. 9 July 62, 34p. incl. illus. table, 20 refs. (Rept. no. FGT-2957, pt. 1)
(Contracts AF 33(600)41891 and AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Steel, *Corrosion, *Fracture (Mechanics), Stresses, Corrosion inhibition, Failure (Mechanics), Grains (Metallurgy), Heat treatment, Coatings, Electroplating, Processing, Test methods, X-ray diffraction analysis, Landing gear.

High strength alloy steels, such as 4340 and 4335 are susceptible to stress corrosion cracking. It is generally agreed by authorities on the subject that the underlying cause of stress corrosion cracking is the marked electrochemical difference in grain bodies and grain boundaries. There is conflicting opinion on how corrosion and stress (tensile) cause the phenomenon to occur. X-ray diffraction appears to be an excellent nondestructive test method for determining stress corrosion cracking susceptibility of metal alloys. Indications are that shot-peening followed by coatings (paints or platings) anodic to the substrate to be protected is an acceptable procedure for prolonging the time before stress corrosion cracking starts in a susceptible metal alloy. (Author)

AD-286 282 Div. 17
(TISTM/CDN) OTS price $2.60

General Dynamics/Fort Worth, Tex.
MATERIAL - MAG THORIUM HK31 - H24 SKINS ANDERSON PROCESS FORMED - EVALUATION OF.
Test rept., 8 - 24 July 57,
by W. T. Kaarlela. 8 Oct 62, 26p. incl. illus. tables (Rept. no. FGT-1703)
(Contracts AF 33(038)21250 and AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Alloys, *Magnesium alloys, Tensile properties, Fracture (Mechanics), Airplanes, Thorium alloys, Sheets, Elasticity, Tests, Materials, Airplane panels, Mechanical properties.

An evaluation of 3 sheets of HK31 Mg alloy cold formed by the Anderson process showed large variations in the tensile and compressive yield strength between the longitudinal and transverse directions. Control tests of as-received sheet did not show these large variations. The most prominent effect of the Anderson process on the mechanical properties was in the longitudinal direction. There were reductions of up to 47% in the tensile yield strength and 30% in the compressive yield strength. Decreases of this magnitude were present on all 3 sheets and in both the slightly and appreciably worked areas. The only properties which showed increases were the ultimate tensile and compressive yield strengths in the transverse direction. These increases varied in the 3 sheets. Cracking was observed to some degree on all sheets. This cracking is the result of excessive cold work acting on stress risers consisting of inclusions and scratches. (Author)

AD-286 284 Div. 17
(TISTM/ODN) OTS price $1.10

General Dynamics/Fort Worth, Tex.
FIXTURE - TENSION-COMPRESSION FATIGUE TESTING -

DESIGN OF.
Test rept., Apr-Nov 57,
by W. M. Pratt. 8 Oct 62, 8p. incl. illus. table, ref. (Rept. no. FGT-1825)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Fatigue (Mechanics), *Test equipment, Design, Tests, Test methods, Steel, Tensile properties.

The upper head of the multiplying fixture of the SF-1U fatigue testing machine, and the grips for holding the specimen were redesigned and rebuilt. Specimens can now be loaded for testing without the turning movements which introduced torque and/or bending moments into the specimen. Redesign of the specimen gripping arrangement has greatly reduced the time and labor necessary to load specimens for testing. Limited testing with steel specimens in the range of medium to high cyclic tension-compression loads has shown improved fatigue life with results that compare favorably with results obtained by other means of testing. Additional work to assure true alignment of the multiplying fixture and the gripping arrangement, and further testing with low cyclic loads such as those employed in testing Al and Mg is recommended. (Author)

AD-286 285 Div. 17
(TISTM/ODN) OTS price $1.60

General Dynamics/Fort Worth, Tex.
DESCALING; REMOVAL OF HEAT-TREAT SCALE FROM STAINLESS STEELS,
by K. M. Waters and R. E. Forrester. 8 Oct 62, 17p. incl. illus. tables (Rept. no. PCTR-4522)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Stainless steel, *Heat treatment, *Scale, Alloys, Solutions, Sulfuric acid, Nitric acid, Fluorides, Hydrogen compounds, Permanganates, Sodium compounds, Dichromates, Surfaces, Materials, Tests, Processing, Cleaning.

Several panels of 17-7 PH stainless steels were cleaned by various procedures and heat-treated to the TH 1050 condition. The cleaning procedure which proved to be the most effective in reducing the amount of scale and decreasing the nonuniformity of the scale was used for preparing all the samples for the subsequent tests. The cleaning and descaling solutions and procedures recommended by 8 different vendors were tested for scale removal properties, along with the effect produced on the base material. Other descaling solutions were developed and tested in the same manner as the vendors samples. Heat-treated PH 15-7 Mo stainless steel was descaled by the use of the procedure selected from these tests as the best for descaling 17-7 PH TH 1050 and examined for harmful effects. The preferred procedure for producing clean scale-free heat-treated stainless steel parts was to treat the parts by vapor degreasing, cleaning in a steel passivating solution, heat-treating, conditioning the scale by an alkaline permanganate immersion, and removing the scale in an acid descaling solution composed of a mixture of H_2SO_4, HNO_3, HF and $Na_2Cr_2O_7$. (Author)

AD-286 312 Div. 17
(TISTM/ODN) OTS price $1.60

Aerospace Information Div., Washington, D. C.
OAR (RRY) SPECIAL TRANSLATION,
by Z. I. Alizade. 1962, 19p. incl. illus. tables, 6 refs. (Trans. from Magnetostriction of Binary Alloys of Some Transition Metals. IN: Moscow. Universitet. Vestnik, No. 9, pp. 67-77, 1950)
Unclassified report

DESCRIPTORS: *Alloys, *Magnetostriction, *Intermetallic compounds, Strain gages, Iron alloys, Nickel alloys, Platinum alloys, Palladium alloys, Ferromagnetic materials, Ferromagnetism, Transition elements, USSR.

By means of a new method of measurement involving a wire strain gage, longitudinal magnetostriction was investigated in binary ferromagnetic alloys of some transition metals (Fe, Ni, Pt, and Pd) and in pure Ni alone. In the Fe-Pd binary system with Fe_3Pd composition (60% Fe and 40% Pd), an alloy having high positive-saturation striction of $+70 \times 10$ to the -6 power was found. In the Ni-Pd binary system, a series of alloys with high negative-saturation striction was found. In this system maximum negative-saturation striction is exhibited by the Ni_3Pd alloy. Thus, in contemporary literature in addition to the already known high striction alloys FeCo and Fe_3Pt, two more binary systems, Fe-Pd and Ni-Pd, which contain alloys exhibiting high saturation striction -- positive in the first and negative in second system have been found. As far as is known from the literature this is the first investigation of magnetostriction in the Fe-Pd, Ni-Pt, and Ni-Pd binary systems. (Author)

AD-286 319 Div. 17
(TISTM/ODN) OTS price $2.60

Brown U., Providence, R. I.
DYNAMIC PLASTICITY EXPERIMENTS ON ALUMINUM CANTILEVER BEAMS AT ELEVATED TEMPERATURE,
by S. R. Bodner and W. G. Speirs. Aug 62, 20p. illus. 6 refs. (Technical rept. no. 31)
(Contract Nonr-56220, Proj. NR 064-424)
Unclassified report

DESCRIPTORS: *Aluminum alloys, *Cantilever beams, Deformation, Theory, Stresses, Alloys, Temperature, Plasticity.

Permanent plastic deformation of impulsively loaded aluminum alloy (3003-H14) cantilever beams at temperatures up to 400 F was studied. Results were compared to the predictions of the basic rigid-perfectly plastic theory and to those of a rigid-plastic theory that included the strain rate sensitivity of the yield stress and changes in the geometry. At 400 F the experimental results differed appreciably from those of the basic theory and were in good agreement with those of the rate dependent theory. The latter results were also relatively insensitive to the detailed analytical form of the strain rate law used in the analysis. (Author)

AD-286 320 Div. 17
(TISTM/ODN) OTS price $2.60

Metals Research Lab., Brown U., Providence, R. I.
SOME ASPECTS OF GRAIN BOUNDARY MIGRATION IN PLASTICALLY DEFORMED SINGLE CRYSTALS,
by B. K. Basu and C. Elbaum. May 62, 11p. illus.
(Contract AF 49(638)479)
(AFOSR-2643) Unclassified report

DESCRIPTORS: *Grains (Metallurgy), *Aluminum, *Single crystals (Metallurgy), Plasticity, Deformation, Crystallization, Crystals, Solids, X-ray diffraction analysis.

The migration of various grain boundaries is

studied in Al specimens; these specimens are prepared from single crystals, deformed plastically at room temperature. Boundary velocities are measured (for a given temperature) as a function of boundary rotation and position paramenters. Dislocation densities and arrangements are determined in the recrystallized volume of the specimen, by means of an X-ray diffraction technique suitable for this purpose. Large differences have been found in the mobility of grain boundaries, as a function of boundary position (tilt or twist), for a given rotation angle. Correlations between boundary angle and dislocation density in the recrystallized volume are discussed. The passage of certain grain boundaries was found to produce crystals of unusually low dislocation density and very uniform reflecting power for X-rays. Crystals of comparable perfection are frequently encountered in some ionic and covalent solids, but are quite unusual in Al. (Author)

AD-286 364 Div. 17
(TISTM/ODN) OTS price $1.10

General Dynamics/Fort Worth, Tex.
MATERIAL - BARE 2219-F ALUMINUM ALLOY - ELEVATED TEMPERATURE - CORROSION PROTECTIVE SURFACE TREATMENT FOR - DETERMINATION OF,
by J. L. Cozart. 23 Aug 62, 8p. incl. tables.
(Rept. no. FTDM-2222)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Aluminum alloys, *Corrosion inhibition, Alloys, Temperature, Sea water, Tests, Tensile properties, Sprays, Coatings, Corrosion, Metal coatings, Surfaces.

Bare X-2219-F Al with Type I or Type II anodize coating applied per MIL-A-8625A exhibits no corrosion after a 24 hour heat soak at 600 F followed by 250 hours salt spray exposure. Under identical conditions the alloy with 0.001 in. Hardas coating exhibits an average of 2.6 pits/sq. in. of exposed surface. The tensile properties of bare, Type I, Type II and Hardas anodized X-2219-F Al prior to and following 250 hours salt spray exposure were determined and are presented. (Author)

AD-286 443 Div. 17, 25
(TISTM/TCG) OTS price $1.60

Institute of Tech., U. of Minn., Minneapolis.
STACKING FAULTS IN SILVER-LITHIUM ALLOYS,
by R. C. Sundahl and J. M. Sivertsen.
29 June 62, 8p. illus. 15 refs. (Technical rept. no. 5)
(Contract Nonr-71029)
Unclassified report

DESCRIPTORS: *Silver alloys, *Lithium alloys, *Crystal structure, Alloys, Molecular association, Lattices, Phase studies, Solubility, Density.

Determination of the stacking fault probabilities (densities) in the Ag-Li system as a function of atom fraction of Li in the alloys is reported. The Ag-Li system shows extensive solubility of Li in Ag. This system is unique since it is the only one reported which shows an alkali metal having a significant solubility in a noble metal. The fact that the solvus curve is practically independent of temperature and that the lattice parameter changes by only about 1% below the value for pure Ag indicates that the size effect is quite small; (independent evidence from diffuse scattering of X-rays also agrees with this result). The observed decrease in stacking fault energy is thus what one expects due to the large difference in the electronegativity of Ag and Li.

AD-286 445 Div. 17, 12
(TISTM/EJH) OTS price $3.60

Polytechnic Inst. of Brooklyn, N. Y.
METALLURGICAL ANALYSIS OF ABLATED ALUMINUM ALLOY HEMISPHERES,
by G. J. Fischer and R. Maciag. July 62, 16p. illus. 3 refs. (PIBAL rept. no. 653)
(Contract Nonr-83923, Proj. NR 064-433)
Unclassified report

DESCRIPTORS: *Aluminum alloys, *Rocket noses, *Aerodynamic heating, Heat, Absorption, Hypersonic flow, Microphotography, Metallurgical analysis, Hardness, Mechanical properties, Surfaces, Photographic analysis, Heat resistant alloys, Ablation, Phase studies.

A metallurgical analysis was performed on 3 Al alloy (356 T-6) hemispherical nose cones which were ablated in a hypersonic tunnel. The analysis consisted of macroscopic examination, metallography and hardness measurements of the cross-sectioned surfaces of the hemispheres. The results of the metallurgical tests were correlated with temperature data, and used to evolve a method of revealing the heat absorption gradient throughout the hemispheres. Conclusions: Hardness gradient data correlate with temperature and heat absorption data. The hardness and macrostructure studies provide an additional method of observing results of heat absorption gradients. Ablation damage was due to removal of melted eutectic by the high-energy air stream. The hardness-macrostructure gradient studies can be applied to alloys other than aluminum for higher temperature range investigations. (Author)

AD-286 469 Div. 17, 26
(TISTM/EJH) OTS price $1.60

Armour Research Foundation, Chicago, Ill.
IMPROVED PRODUCTION OF POWDER METALLURGY ITEMS.
Interim technical documentary progress rept., 1 July-30 Sep 62,
by K. Farrell and N. M. Parikh. Oct 62, 9p. incl. illus. table (Rept. no. ARF B247-3)
(Contract AF 33(657)9140, Proj. 7-911)
(ASD TDR 7-911, vol. 1) Unclassified report

DESCRIPTORS: *Powder alloys, *Atomization, *Powder metallurgy, *Nickel alloys, Powder metals, Chromium alloys, Aluminum alloys, Liquid metals, Melting, Argon.

Initial studies concerned with the production of superalloy powders by inert gas atomization of liquid metal alloys are described. Techniques were developed for melting and atomization of Inco 713C. Argon gas was employed for atomization. Relations between atomization pressures, melt temperature and powder characteristics were established. The properties of the powders produced to date are summarized and discussed. Important features of the equipment used in this program are also discussed. The powders produced are fine, have good flow characteristics and low interstitials. (Author)

AD-286 474 Div. 17
(TISTM/TCG) OTS price $2.60

General Dynamics/Convair, San Diego, Calif.
STRENGTH OF WELDED JOINTS ON MATERIAL - STRUCTURAL STEEL - UNITED STATES STEEL CORPORATION T-1 AND ASTM A-201,
by H. Stier, P. W. Bergstedt, and H. C. Turner.
26 Oct 59, 20p. incl. illus. tables, 2 refs.
(Rept. no. 8926-019)
Unclassified report

DESCRIPTORS: *Steel, *Sheets, *Welded joints, Deformation, Tensile properties, Fracture (Mechanics), Radiographic analysis, Ultrasonics, Non-destructive testing, Thickness, Mechanical properties.

Radiographically sound welds in 3/4- and 1-in. thick plates depended on weld joint design. Pertinent design detail for joints tested is given. Weld metal deposited in U.S.S. T-1 plate with Mil-E-19322 Type Mil 11018 electrodes ranged from 131.1 to 137.7 in. ultimate strength. Butt weld strength with these materials was 142.4 ksi, and bend tests showed the welded joints capable of 4 to 6% outer fiber elongation. (Author)

AD-286 480 Div. 17, 25
(TISTM/TCG) OTS price $2.25

Battelle Memorial Inst., Columbus, Ohio.
INVESTIGATION OF NOTCH FATIGUE BEHAVIOR OF CERTAIN ALLOYS IN THE TEMPERATURE RANGE OF ROOM TEMPERATURE TO -423F.
Final rept., 1 Feb 61-15 Mar 62 on Materials Application,
by Donald N. Gideon, Ronald J. Favor and others.
Aug 62, 79p. incl. illus. tables, 12 refs.
(Contract AF 33(616)6888, Proj. 7381)
(ASD TDR 62-351)
Unclassified report

DESCRIPTORS: *Alloys, *Fatigue (Mechanics), *Cryogenics, Steel, Stainless steel, Nickel alloys, Copper alloys, Beryllium alloys, Titanium alloys, Brass, Iron alloys, Metals, Low temperature research, Aging, Tensile strength, Heat treatment, Sheets, Mechanical properties.

The notched fatigue behavior of 13 alloys was investigated in the temperature range room temperature to -423 F and in the lifetime range 10 to the 4th power to 10 to the 6th power cycles. The alloys studied were chosen on the basis of actual or potential application in missile and spacecraft cryogenic systems. The materials were in sheet form and were fatigued in fully reversed bending experiments. V-notches in the edges of the specimens had theoretical stress concentration factors of about 3.1 and 6.4. The results are presented as S-N plots and comparisons with unnotched fatigue strengths are made in tables of notch sensitivity values. S-N plots of the unnotched fatigue data obtained in the previous year are included for convenience. (Author)

AD-286 532 Div. 17
(TISTM/TCG) OTS price $1.10

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.
EVALUATION OF TYPE H-11 (5-CHROME) STEEL AT HIGH STRENGTH LEVELS,
by J. Viglione. 6 Aug 62, 3p. (Rept. no. NAMC-AML-1503)
Unclassified report

DESCRIPTORS: *Steel, *Chromium alloys, *Fracture (Mechanics), Heat treatment, Alloys, Mechanical properties.

Test results show that air quenched Halcomb 218 sheet material tempered at temperatures ranging between 1050 and 1150 F gave approximately equal values for net fracture strength, and for crack extension force. (Author)

AD-286 539 Div. 17
(TISTM/SJR) OTS price $1.60

Watertown Arsenal Labs., Mass.
MASS EFFECT ON TENSILE PROPERTIES OF HIGH STRENGTH STEEL CASTINGS,
by Paul J. Ahearn. Sep 62, 15p. incl. illus. tables, 8 refs. (Technical rept. no. WAL TR 320.1/9)
Unclassified report

DESCRIPTORS: *Steel castings, Steel, Density, Stresses, Mechanical properties, Grains, Fracture, Alloys, Manufacturing methods, Fluorescence, X rays, Tensile properties.

The effect of mass on the tensile properties of high strength (about 240,000 psi tensile strength) steel was determined by tests on specimens removed from a 6-inch-square and an 8-inch-diameter cast coupon. The steel employed was a modified 4330 steel with low sulfur and phosphorus contents. In addition to true stress-true strain tensile tests, metallographic and microradiographic studies were conducted to investigate the cause of this mass effect. All significant tensile properties were reduced by increasing mass or decreasing solidification rate; the reduction of area and true fracture strain were reduced to the greatest extent and the engineering tensile strength the least amount. The best properties were obtained in the columnar grain zone near the outside of the coupons. Mass effect appeared to be caused by the increased amount and greater intensity of the alloy segregation and larger dendritic arm spacing towards the center of the casting. The results indicated that non-metallic inclusions and micro-shrinkage did not produce this loss in properties with increasing mass in these steel castings. (Author)

AD-286 595 Div. 17, 26
(TISTM/EJH) OTS price $5.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PROBLEMS OF POWDER METALLURGY AND THE STRENGTH OF MATERIALS (SELECTED ARTICLES).
10 Sep 62, 53p. incl. illus. tables, 42 refs.
(Trans. no. FTD-TT-62-506 from Voprosy Poroshkovy Metallurgii i Prochnosti Materialov, AN UKSSR, Institut Metallokeramiki i Spetsial'nykh Splavor, No. 7, pp. 33-38, 39-45, 46-56, 105-119, 1959)
Unclassified report

DESCRIPTORS: *Powder alloys, *Powder metals, *Powder metallurgy, Mechanical properties, Elasticity, Nickel alloys, Tungsten alloys, Phase studies, Solids, Liquids, Wetting agents, Surfaces, Fracture (Mechanics), USSR, Translation, Manufacturing methods, Molding, Pressure, Electron microscopy.

Contents: Research on the Modulus of Elasticity of Alloys; The Influence of Interphase Surface Energy on Wettability; Electron-Microscope Investigation of Break Surfaces; A Study of the Influence of Technological Factors on the Pressability of Iron Powders.

AD-286 649 Div. 17, 25
(TISTM/ODN) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
STUDIES OF NONDESTRUCTIVE TESTING TECHNIQUES TO CONTROL PROPERTIES OF CASE HARDENED STEEL COMPONENTS,
by R. D. Korytoski, H. P. Hatch, and E. H. Abbe.
1962, 13p. incl. illus. tables.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Steel, *Small arms, *Non-destructive testing, Physical properties, Magnetic effects, Hardness, Hysteresis, Heat treatment, Tests, Magnetic properties.

Details of an extensive study to develop simple, accurate, nondestructive testing techniques suitable for inspection of small arms case hardened components are presented. Results of measurements made of magnetic retentivity, flux density, and coercive force and permeability tests conducted comparing amplitude of the fundamental wave, amplitude of the third harmonic wave and wave form distortion are reported. The applicability of mechanical hardness tests for inspection of case hardened parts is also discussed. Relations of magnetic properties to the case-core physical and metallurgical characteristics and the effects of variables, particularly tempering temperature and time are treated. (Author)

AD-286 697 Div. 17
(TISTM/SJR) OTS price $1.60

Armour Research Foundation, Chicago, Ill.
PILOT EVALUATION OF VANADIUM ALLOYS.
Bimonthly rept. no. 6, 18 July-17 Sep 62,
by B. R. Rajala and F. C. Holtz. 15 Oct 62,
13p. incl. tables (Rept. no. ARF 2231-6)
(Contract Now 62-0101-c)
Unclassified report

DESCRIPTORS: *Vanadium alloys, *Niobium alloys, Alloys, Heat resistant alloys, Molybdenum alloys, Refractory materials, Ruthenium, Tantalum alloys, Tungsten alloys, Tensile properties, Mechanical properties, Manufacturing methods, Sheets, Extrusion.

Vanadium-niobium alloys containing reactive and refractory metal and interstitial additions were prepared as 200-gram nonconsumable-electrode arc-melted ingots. At the 20w/o Nb level, strengths as high as 54,000 psi at 2000 F were measured for a V-5w/o Ti-20w/o Nb-10w/o Ta composition; at 60w/o Nb, the strongest alloy was V-1w/o Ti-60w/o Nb-2.5w/o Mo-0.5w/o Ru which had an ultimate tensile strength of 65,500 psi at 2000 F. Additions of W, Ta, or Mo generally caused reduced fabricability and ductility. Extruded bar stock and warm-rolled plate and sheet from the 100-pound consumable-electrode arc-melted ingot of V-1w/o Ti-60w/o Nb were received. Initial examination indicated that this material was free from defects. (Author)

AD-286 703 Div. 17
(TISTM/ODN) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
MATERIAL - TITANIUM - Ti 5Al 2 1/2Sn ALLOY (A-110-AT) HEAT TREATMENT RELIEF OF BAUSCHINGER EFFECT,
by J. L. Harvey, W. M. Parker, and E. E. Keller.
13 May 59, 3p. incl. table (Rept. no. 8926-035)
(Contract AF 33(600)30169)
Unclassified report

DESCRIPTORS: *Alloys, *Titanium alloys, Tin alloys, Aluminum alloys, Heat treatment, Metal forming brakes, Stresses, Sheets, Mechanical properties.

The compression yield strength of 90 deg angles press brake formed in 0.040 inch thick Ti 5Al-2 1/2Sn (A-110-AT) Ti alloy with 0.1875 inch bend radius was determined after forming, and after 30 and 90 minutes of heating at 1150 F subsequent to forming. Comparison of the compression yield strength of flat stock with formed angles showed the following compression yield strength losses as a result of bending: press brake form, 10.5; press brake form, 30 minutes at 1150 F, 8.9; press brake form, 90 minutes at 1150 F, 3.0. (Author)

AD-286 758 Div. 17
(TISTM/TCG) OTS price $3.60

Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
FRACTURE CHARACTERISTICS OF STRUCTURAL METALS.
Quarterly rept. no. 1, 1 July-30 Sep 62,
by G. L. Hanna and E. A. Steigerwald. 30 Sep 62,
36p. incl. illus. tables, 18 refs. (Rept. no. TM 3505-67)
(Contract N600(19)58831)
Unclassified report

DESCRIPTORS: *Heat resistant alloys, *Steel, *Aluminum alloys, *Titanium alloys, *Fracture (Mechanics), Metals, Structures, Tensile properties, Stresses, Heat treatment, Alloys, Literature, Mechanical properties.

The feasibility of employing plane strain fracture toughness (K sub IC) as a handbook type parameter to categorize the resistance of high-strength materials to crack propagation was determined. The K sub IC values were calculated from a literature survey on the available notch data for high-strength materials. The existing data are not sufficient to allow a significant conclusion to be made concerning the applicability of K sub IC as a handbook parameter. A test program was initiated with 4340, H-11, 18% nickel maraging steel and beta titanium to obtain meaningful K sub IC values. The program will involve several heats of each material and will be conducted over a range of test temperatures. (Author)

AD-286 832 Div. 17
(TISTM/TCG) OTS price $2.50

Lessells and Associates, Inc., Boston, Mass.
FATIGUE AND DYNAMIC CREEP OF HIGH-STRENGTH STEELS.
Summary rept., Jan 60-Mar 62,
by R. F. Brodrick. Aug 62, 105p. incl. illus. tables, 3 refs.
(Contract AF 33(616)6946, Proj. 7381)
(ASD TDR 62-480) Unclassified report

DESCRIPTORS: *Heat resistant alloys, *Steel, *Fatigue (Mechanics), *Creep, Tensile properties, Stresses, Elasticity, Dynamics, Mechanical properties.

A program was conducted to obtain detailed tensile, stress rupture and fatigue data on a series of high-strength steels. Data were obtained from D6AC, LaBelle HT, Thermold J, Vascojet 1000 and Peerless 56, heat treated to nominal ultimate strength of 280,000 psi. Tests were conducted at room temperature and at elevated temperatures, the particular temperatures being selected according to the material. Maximum test temperature was 1000 F. Dynamic creep data were obtained in conjunction with the fatigue tests. (Author)

AD-286 840 Div. 17, 14
(TISTM/ODN) OTS price $1.60

General Dynamics/Fort Worth, Tex.
MATERIALS - UNCLAD 2020 ALUMINUM ALLOY CORROSION

PROTECTIVE SURFACE TREATMENT FOR - DETERMINATION OF.
Test data memo.,
by J. D. Reynolds. 24 Nov 58, 10p. incl. illus. tables (Rept. no. FTDM-2124)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Aluminum alloys, *Corrosion inhibition, *Coatings, Surfaces, Sulfuric acid, Anodes, Sea water, Sprays, Elasticity, Films, Tensile properties, Humidity, Alloys, Corrosion, Chromic acid.

Various protective coatings for unclad 2020 Al alloy were evaluated. Type II H_2SO_4 Anodic Coating imparts satisfactory corrosion resistance to unclad 2020 Al alloy. Alodine 1200 Chemical Film Treatment provides adequate protection to salt spray environment in accordance with Mil-C-5541. However, the treatment does not prevent a considerable reduction in % elongation after humidity exposure. Type I H_2CrO_4 Anodic Coating on unclad 2020 Al alloy fails to meet the requirements of Mil-A-8625A. (Author)

AD-286 842 Div. 17
(TISTM/ODN) OTS price $1.10

General Dynamics/Fort Worth, Tex.
PROCESS-ELECTROLESS NICKEL-THICKNESS REQUIREMENTS FOR HARDNESS TESTING - DETERMINATION OF.
by J. D. Reynolds. 23 Apr 58, 2p. incl. table
(Rept. no. FTDM-1907)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Nickel plating, *Thickness, *Hardness, Steel, Alloys, Aluminum alloys, Plating, Solutions, Electroplating solutions.

Electroless Ni plated well on all specimens. The rate of deposition on 4130 steel was considerably less, being approximately 3 mils in 5 hours, as compared with 3 mils in 90 minutes on the 2024 Al alloy. However, the Ni exhibited poor adhesion to the 2024 Al coupon. One plated 4130 steel coupon was heat treated to improve hardness at 700 F for one hour and air cooled. Each one of the 3 plated specimens was sectioned and mounted in bakelite. The Tukon hardness test was made on the mounted specimens in the edge of the Ni plate to establish the true hardness of the Ni plating. The Rockwell C hardness was not applicable. The Rockwell 15N superficial hardness, being quite shallow and suited for surface hardness, was determined. The Vickers tester was not available. (Author)

AD-286 843 Div. 17
(TISTM/ODN) OTS price $1.10

General Dynamics/Fort Worth, Tex.
MATERIALS - TRUE STRESS - TRUE STRAIN CURVES - DETERMINATION OF.
Test data memo,
by V. Levy. 26 Feb 59, 9p. incl. illus. table
(Rept. no. FTDM-2190)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Alloys, *Steel, *Stainless steel, *Titanium alloys, *Magnesium alloys, Tests, Heat treatment, Data, Stresses.

Bars were tested in a 60,000 lb. Baldwin universal test machine using a KSMD extensometer and an MA-1 microformer recorder. For Mg the magnification to the yield point was 500X and for all of the other specimens the magnification was 250X to yield. The load was then removed and the magnification was reduced to 20X for the test to failure. Initial and final diameters were recorded. The method of MacGregor was used to determine true stress-true strain relationships. Values for true stress and true strain were computed from the test data using the following relationships: True strain = $\ln (1 + e)$, e = Nominal strain. True stress = $P (1 + e)/A$, P = Measured load, A = Original area. Each true stress-true strain curve presented was determined from the results of one specimen. The results are empirical. (Author)

AD-286 844 Div. 17
(TISTM/ODN) OTS price $2.60

General Dynamics/Fort Worth, Tex.
MATERIAL - Mn-Al - BRONZE, FMS-0059 STRENGTH PROPERTIES - DETERMINATION OF.
Test data memo.,
by C. N. Lovell. 5 Dec 57, 26p. incl. illus. tables (Rept. no. FTDM-1787)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Bronze, *Alloys, Manganese alloys, Aluminum alloys, Tensile properties, Stresses, Tests, Strain gages, Data, Temperature, Mechanical properties.

The average compressive yield strength of bronze tensile specimens decreased from 87,930 psi at R.T. to 61,030 psi at 400 F, which is 30.6% decrease in R.T. strength. The average compressive modulus decreased from 17.9 x 10 to the 6th power psi at R.T. to 11.9 x 10 to the 6th power psi at 400 F. A comparison of strength at R.T. with the strength at the elevated temperatures is given. Results consist of empirical data which are to be used for the purpose of establishing design allowables. (Author)

AD-286 845 Div. 17
(TISTM/ODN) OTS price $1.60

General Dynamics/Fort Worth, Tex.
MATERIALS - MAGNESIUM THORIUM HM21-T8 ROOM AND ELEVATED TEMPERATURE PROPERTIES - DETERMINATION OF.
Test data memo.,
by S. V. Glorioso. 31 Oct 58, 13p. incl. illus. tables (Rept. no. FTDM-2107)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Intermetallic compounds, *Magnesium alloys, *Thorium alloys, Temperature, Tensile properties, Alloys, Sheets, Elasticity, Spot welds, Spot welding, Welded joints, Mechanical properties.

Ultimate tensile strength, tensile yield strength, % elongation for each tensile specimen, and the ultimate shear strength for each spot weld are presented. The effect of temperature on ultimate strength, yield strength and % elongation for specimens held at test temperature 1 minute and 2 hours was determined. Tensile data for HM21-T8 sheet at room temperature are listed in the literature as Ftu equals 34,000 psi, Fty equals 25,000 psi and elongation equals 10% for gages up to .125 in. Because the room temperature tensile data for 0.63 gage were not in agreement with the vendor's data, these tests were duplicated using .090 gage material. The room temperature properties for .090 gage HM21-T8 compare favorably with the above data. Specimens which were spot welded using severe machine settings had higher shear strengths for every sheet gage combination. When using these settings average strengths were increased from 18 to 65% depending on the sheet gage combination. (Author)

AD-286 863 Div. 17, 14, 25
(TISTM/SJR) OTS price $2.00

Institute of Engineering Research, U. of Calif., Berkeley.
THERMAL RADIATION PROPERTIES OF MATERIALS, PART II.
Final rept., Sep 60-Dec 61 on Materials Analysis and Evaluation Techniques,
by R. A. Seban. Aug 62, 72p. incl. illus. tables, 12 refs.
(Contract AF 33(616)6630, Proj. 7360)
(WADD TR 60-370, pt. 2) Unclassified report

DESCRIPTORS: *Thermal radiation, *Refractory materials, *Ceramic coatings, Ceramic materials, Coatings, Oxides, Reflection, High temperature research, Photoemission, Nickel alloys, Platinum, Test methods, Test equipment, Copper, Stainless steel, Molybdenum, Alloys, Platinum alloys, Molybdenum alloys, Rhodium alloys, Titanium compounds, Boron compounds, Iron compounds, Thermocouples, Aluminum wire, Chromium alloys, Metals.

Results obtained for the spectral emittance of materials measured in air at intermediate temperatures of about 1400 F are compared to the spectral reflectances measured at room temperature. The temperature effect is found to be small for oxidized metals and for ceramic coatings and some of the apparent effects are still associated with variation of the material and with inaccuracy of measurement. Spectral emittances for metals were determined only for platinum. A system designed for the determination of the spectral emittance of metals or of materials with metallic substrates, in vacuum or in an inert atmosphere, is described and preliminary results are indicated for Inconel. (Author)

AD-286 880 Div. 17
(TISTM/SJR) OTS price $1.00

General Electric Co., Schenectady, N. Y.
EFFECT OF BASIC PHYSICAL PARAMETERS ON ENGINEERING PROPERTIES OF INTERMETALLICS.
Final rept., Dec 60-Dec 61 on Refractory Inorganic Non-Metallic Materials,
by J. H. Westbrook and D. L. Wood. July 62, 31p. incl. illus. tables, 35 refs.
(Contract AF 33(616)7714, Proj. 7350)
(WADD TR 60-184, pt. 3)
Unclassified report

DESCRIPTORS: *Intermetallic compounds, Brittle materials, Grains, Metallic crystals, Castings, Aluminum compounds, Magnesium compounds, Nickel compounds, Silver compounds, Deformation, Fracture, Transition temperature, Titanium compounds, Cobalt compounds, Iridium compounds, Chromium compounds, Molybdenum compounds, Silicon compounds, Zirconium compounds, Beryllium compounds, Tantalum compounds, Nitrogen, Oxygen, Heat treatment, Hardness, Electron microscopy, Mechanical properties.

An increased hardness of grain boundary regions above that of the bulk material is found to exist generally in intermetallic compounds having a stoichiometric excess of active metal component. This hardening is shown to be associated with the anomalously high brittle-ductile transition temperature in these materials, and to be related to the 'pest' phenomenon. The presence of adsorbed oxygen and/or nitrogen in grain boundary regions is found to be responsible for the increased hardness in these areas; the precise manner in which the resistance to plastic deformation is increased in this phenomenon is not clear. The effect can be modified by ternary solute additions and to some extent by appropriate annealing treatments. (Author)

AD-286 896 Div. 17
(TISTM/SJR) OTS price $3.60

Northrop Corp., Hawthorne, Calif.
METHODS OF TESTING FOR HYDROGEN EMBRITTLEMENT.
Final report on ARTC Project W-95,
by M. E. Carlisle. 21 Oct 59, 35p. incl. illus. tables, 7 refs. (Rept. no. NOR-59-472)
Unclassified report

DESCRIPTORS: *Hydrogen embrittlement, *Steel, Standardization, Test methods, Aircraft, Guided missiles, Tensile properties, Failure, Stresses.

The results are presented of a cooperative test program conducted by members of the AIA-ARTC in an attempt to establish a standard test method for hydrogen embrittlement. The six basic methods investigated were the tensile test, stressed ring test, sustained load notched tensile test, constant-rate bend test, torqued bolt test, and static bend test. Modifications of the test specimens and procedures brought the total number of methods investigated to twelve. Conclusions are drawn as to the most accurate methods now available and the direction that further work on hydrogen embrittlement testing should take. (Author)

18. MILITARY SCIENCES AND OPERATIONS

AD-285 819 Div. 18
(TISTW/RD) OTS price $2.60

Operational Applications Lab., Air Force Electronic Systems Div., Bedford, Mass.
TACTICAL DECISION MAKING II THE EFFECTS OF TRACK LOAD ON DAMAGE, COST, AND KILLS.
Preliminary Summary rept.,
by Donald W. Connolly, Charles C. McGoldrick, and Wyatt R. Fox. Nov 61, 17p. incl. illus. 4 refs.
(ESD TR 61-43) and (AFCRL-998)
Unclassified report

DESCRIPTORS: *Aerial warfare, *Aerial targets, *Weapons, Jet fighters, Guided missiles (Surface to air), Costs, Interception probabilities, Antiaircraft defense systems, Punched card methods, Operations research, Air force operations, Data processing systems, Simulation, Mathematical prediction, Warfare, Human engineering, Identification, Selection.

Five highly trained and experienced subjects were required to perform threat evaluation and action selection functions under aerospace threat loads of from 60 to 96 incoming tracks. Comparisons are made between the performance of the human decision makers and the performance of an 'idealized' system in the present experiment as well as in a previous experiment in which conditions of surveillance data quality, threat performance and counter-weapon capability differed. While experiment I showed superior weapon economy for the human decision makers, the same subjects in experiment II appeared quite prodigal of their counter weapons. Both experiments demonstrate the remarkable capability of the human decision maker to approach the performance of an idealized system, even though he is operating in real time and under considerable stress. (Author)

AD-286 045 Div. 18
(TISTP/FR) OTS price $1.10

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
FIELD EXPERIMENTATION AS AN AID TO OPERATIONS RESEARCH,
by F. J. Murdoch, Jr. and Carl C. Edmondson. 1962, 7p.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, United States Military Academy, West Point, New York.

DESCRIPTORS: *Operations research, Army operations.

Even as science has increasingly helped to develop the tools of war, so the methodology of science has been applied to military operations. Operations research, which involves the use of simulation or mathematical models to study the efficiency of man/machine systems, was fruitfully joined with field experimentation in the tactical studies conducted by USA CDEC. Several examples are cited wherein these field experiments contributed data as input to a computer simulation model, thereby contributing to the validity and practicality of the solutions sought. At the same time, the reciprocal benefits are discussed: the use of gaming and simulation studies to help define the factors to be tested in the field, and the use of field exercises to help check the validity of the analytical solutions. (Author)

AD-286 662 Div. 18, 33
(TISTB/AW) OTS price $1.10

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
AN OPERATIONS RESEARCH MODEL OF MOTOR TRANSPORT DERIVED FROM NUCLEAR TRANSPORT THEORY.
by H. Charlton and J. H. Neblett. 1962, 9p. incl. illus. table, 7 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Military transportation, Cargo vehicles, Vulnerability, Logistics, Theory, Operations research, Mathematical analysis, Probability.

A realistic operations research theory of attrition and system performance of land supply carriers is given. The purpose of the Truck-Transport Model study is to test conclusively the viability of (land, if viable, to exploit) the hypothesis that general terrain properties, enemy action, personnel behavior, and limited command decision determine the most probable performance of a land supply system and that this performance can be adequately described by a simplified form of transfer theory. Not explicitly stated is the assumption that the processes which such a model describes are not strictly mechanistic, but that the on-going events are affected by the ensemble of past occurrences. The equations derived express the final form of the theory and are amenable to the following interpretation: They determine the number of loaded trucks in transit per unit area at a given place at at time which, in the course of carrying out a mission, are being subjected to being put out of operation, deflected, or forced to change their speed by terrain, enemy action, or decision. (Author)

AD-286 732 Div. 18
(TISTW/PCR) OTS price $1.60

System Development Corp., Santa Monica, Calif.
PERCEIVED UTILITY OF SEVENTEEN WEAPON SYSTEMS FOR STRATEGIC OR CONVENTIONAL WAR,
by P. B. Carpenter and R. H. Davis. 4 June 62, 18p. incl. illus. 10 refs. (Technical memo. TM-726)
Unclassified report

DESCRIPTORS: *Weapons, *Warfare, Cruisers, Destroyers, Army, Submarines, Armored vehicles, Fighters, Bombers, Fighter bombers, Aircraft carriers, Guided missiles (Strategic), Guided missiles (Surface to surface), Guided missiles (Underwater to surface).

One-hundred weapon system experts rated 17 weapon systems for utility in two different environments -- a strategic war and a limited war. These ranks were used to derive the placement of the weapon systems on equal interval scales. (Author)

19. NAVIGATION

AD-285 609 Div. 19
(TISTW/RD) OTS price $2.75

Dayton U. Research Inst., Ohio.
CHARTS OF CORRECTIONS TO AIRBORNE RADAR OBSERVATIONS FOR REFRACTION BY TERRESTRIAL ATMOSPHERES,
by Paul B. Taylor and Henry T. Mohlman. Sep 62, 129p. incl. illus. tables.
(Contract AF 33(616)7659, Proj. 4062)
(ASD TDR 62-690) Unclassified report

DESCRIPTORS: *Atmospheric refraction, *Shoran, *Radar navigation, *Mapping, Navigation charts, Airborne, Atmosphere, Radar signals, Corrections.

Atmospheric refraction corrections for airborne radar observations are presented. The radar range is treated as the argument and the height difference between observer and target is considered as the parameter in the range observations. With the aid of these corrections, true slant range and map distance may be found. These corrections were computed for sixteen type atmospheres above a spherical earth. In these atmospheres the index of refraction attenuates exponentially with height. The type atmospheres cover four base indices and four exponential attenuation rates. (Author)

AD-286 073 Div. 19
(TISTW/RD) OTS price $1.60

Army Signal Research and Development Lab., Fort Monmouth, N. J.
EVALUATION OF TRANSPONDER SET AN/DPN-65(XE-1),
by Fred H. McCall and Frank P. Marshall. June 62, 15p. incl. illus. tables, 2 refs.
(ASRDL test rept. no. 1503)
(DA Proj. 3C-16-19-001-01)
Unclassified report

DESCRIPTORS: *Radar beacons, *Radar navigation, Tests, Radar tracking, Miniature electronic equipment, Guided missiles (Surface to air), Shipborne, C band.

Acceptance tests were conducted on four design-approval models of transponder set AN/DPN-65 (XE-1). This transponder is a miniature, pulse-type, C-band radar beacon designed for use in the TYPHON and other guided missiles, and in manned and unmanned aircraft to improve radar tracking at extended ranges. The AN/DPN-65(XE-1) weighs

3-1/2 pounds and measures 2/1/2 by 2-1/2 by 7 in. Receiver sensitivity of the beacon is -45 dbm across the frequency range of 5.4 kmc to 5.6 kmc. The transmitted peak power output is 10 watts across the frequency band of 5.5 kmc to 5.7 kmc. Deficiencies uncovered in the evaluation of the design-approval models were corrected by the contractor. The corrections were incorporated in the engineering-test models, which were satisfactory in all respects. (Author)

AD-286 203 Div. 19
(TISTP/TL) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE THEORY OF A GYROSCOPIC SERVOSYSTEM WITH RANDOM NOISE,
by L. Ya. Roytenberg. 20 July 62, 8p. 5 refs. (Trans. no. FTD-TT-62-770 from Doklady Akademii Nauk SSSR, 142:5, pp. 1050-1053, 1962)
Unclassified report

DESCRIPTORS: *Gyroscopes, *Servo systems, Theory, Noise, Signals, Errors, Statistical functions, Matrix algebra, Differential equations, Integral equations, Linear systems.

An analysis is presented which considers the problem of optimal useful-signal reproduction by a gyroscopic servosystem using minimum root-mean-square error as the criterion. (Author)

AD-286 265 Div. 19, 6
(TISTA/VGW) OTS price $2.60

Electronic Systems Div., Air Force Systems Command, Bedford, Mass.
SOME TASKS AND STUDIES CONDUCTED AT NAFEC ON AIRPORT OPERATIONS EQUIPMENT, SYSTEMS, AND TECHNIQUES.
Activity rept.
June 62, 25p. incl. illus. (ESD TDR 62-24)
Unclassified report

DESCRIPTORS: *Air traffic control systems, *Runway lights, *Glide path systems, *Radar navigation, Aviation safety, Airport radar systems, Display systems, Data processing systems, Radar equipment.

APPROACH AND LANDING SYSTEMS: AN/GSN-5 (ST), BLEU Landing System, REGAL, FLARESCAN, and AN/APN-114. AIRPORT LIGHTING SYSTEMS: Sylvania Simplified Approach Lights, Centerline Taxiway Lighting, Runway Crossbars and Distance-To-Go Signs, Electro-Luminescent Surface Lights, and Flush Mounted Threshold Lights. COMMUNICATIONS: Peripheral Communications Facility. DATA ACQUISITION AND PROCESSING: AN/GSN-11, Data Processing Central, ATC Radar Beacon System, Side Lobe Suppression Techniques, Interference Reduction in ATC Radars, and Bright Radar Display. NAVIGATION: VORTAC, Minimum Air Navigation, Airborne Collision Avoidance, Pictorial Displays and Course Line Computers. Fog Simulation. Link Fog Simulator. AIRCRAFT SAFETY: Bird Ingestion Program, Investigation of Seat Belt Webbing Service Life, Jet Transport Arresting Gear, and Aircraft Safety Research. WEATHER: Upper Air Observing Equipment, Automatic Meteorological Observing System, AN/TPQ-11 Radar Cloud Detection, and AN/FMQ-5 Semiautomatic Meteorological Station. (Author)

AD-286 362 Div. 19
(TISTW/RD) OTS price $2.60

Inter-Range Instrumentation Group, White Sands Missile Range, N. Mex.
SPECIFICATIONS FOR LORAN C TIMING RECEIVER.
Oct 62, 18p. (IRIG Document no. 107-62)
Unclassified report

DESCRIPTORS: *Radio receivers, *Hyperbolic navigation, *Radio navigation, Coding, Radio signals, Specifications, Packaging.

Requirements are specified for a Loran-C timing receiver which will: (a) receive and decode Loran-C signals of any present or future group repetition rate at ranges of up to 1500 nautical miles (ground wave); (b) produce pulses which are of the same repetition rate as the group repetition rate of the Loran-C signal being received, and which are time locked to the leading edge of the first pulse of each group of the received signal; (c) provide a 100-kc signal derived from an external frequency standard which is phase locked to the received carrier; and (d) provide an output for indicating and recording the phase difference in microseconds between the received carrier and the output of the external frequency standard. This receiver/decoder will allow widely separated central timing stations to maintain synchronism within ±1 microsec (when in the ground wave service area of a Loran-C chain). (Author)

AD-286 537 Div. 19
(TISTW/RD) OTS price $4.60

Geophysics Corp. of America, Boston, Mass.
AN AUTOMATIC SEXTANT FOR SPACE NAVIGATION,
by H. E. Stubbs. Oct 62, 42p. incl. illus. 4 refs. (GCA Technical rept. no. 62-17-A)
(Contract AF 33(616)7413)
Unclassified report

DESCRIPTORS: *Sextants, *Space navigation, *Satellite vehicles, Automatic, Design, Optical systems, Light pulses, Sources, Navigation.

The design of an automatic sextant for navigation in the solar system is feasible. Within the present state-of-the-art, the instrument can be designed to have an accuracy of 1 microradian and a maximum range of 5 degrees. A preliminary optical and mechanical design for the device is presented and the major features of a program, for the automatic operation of the sextant, are worked out. (Author)

AD-286 605 Div. 19
(TISTW/RD) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
EFFECT OF IMPRECISIONS IN THE MAKING OF A SYMMETRICAL GYROSCOPE ON ITS MOTION,
by N. I. Kuznetsov and M. P. Khalimanovich. 13 Sep 62, 6p. incl. illus. 4 refs. (Trans. no. FTD-TT-62-1158 from Inzhenerno-Fizicheskiy Zhurnal, No. 8, pp. 112-115, 1959)
Unclassified report

DESCRIPTORS: *Gyroscopes, USSR, Differential equations, Mathematical analysis, Theory.

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-285 660 Div. 20
(TISTW/RD) OTS price $3.60

Tracerlab., Inc., Waltham, Mass.
DEVELOPMENT OF RADIAC CALIBRATOR AN/UDM-2 (XE-2).

Final type rept. no. 1, 1 July-15 Nov 61 on Results of Phase I Studies.
Aug 62 30p. incl. tables.
(Contract DA 36-039-sc- 87320, Proj. 3K12-80-006)
Unclassified report

DESCRIPTORS: *Radiation counters, *Test equipment, X rays, Radioactivity, Ionization chambers, Dosimeters, Gamma rays, Calibration, Radiation counters.

AD-285 689 Div. 20
(TISTM/ODN) OTS price $1.60

Ordnance Materials Research Office, Watertown, Mass.
HYPERFINE FIELDS, SPIN ORBIT COUPLING, AND NUCLEAR MAGNETIC MOMENTS OF RARE EARTH IONS,
by R. E. Watson and A. J. Freeman. Feb 62, 9p. incl. illus. tables, 8 refs. (MRL rept. no. 108)
(Proj. DA593-32-007)
Unclassified report

DESCRIPTORS: *Ions, *Nuclear magnetic moments, *Nuclear physics, Paramagnetic resonance, Wave analysis, Spin, Functions, Theory, Rare earth elements.

An investigation is presented of the related problems of hyperfine fields, spin orbit coupling, and the determination of nuclear magnetic moments. All of these are strongly dependent on the 4f charge distributions in the rare earths and play an important role in Mossbauer, NMR, paramagnetic resonance, and optical absorption measurements. The discussion is based on a set of conventional approximate non-relativistic Hartree-Fock wave functions which were determined for eight ions of the series. Results are presented and the various approximations and assumed relationships between these quantities are analyzed and discussed in the light of comparisons between theoretical predictions and experiment. (Author)

AD-285 777 Div. 20
(TISTP/WH) OTS price $1.10

California U., Berkeley.
ATOMIC BEAM RESEARCH.
Final rept., 31 Mar 58-31 Mar 62,
by William A. Nierenberg and Howard A. Shugart.
30 June 62, 7p. incl. tables, 25 refs.
(Contract AF 49(638)339)
(AFOSR-2952) Unclassified report

DESCRIPTORS: *Atoms, *Radioactive isotopes, *Nuclear spins, *Nuclear magnetic resonance, Research program administration.

The Atomic Beam Group of the University of California is devoted to the systematic measurement of various static nuclear and atomic properties. These properties include the nuclear spins, magnetic moments and quadrupole moments as well as atomic hyperfine structures, electronic angular moments and g-factors. These measurements provide a foundation upon which level systematics can be constructed, and also provide test information for nuclear structure theory. The technique employed is the atomic beam magnetic resonance method. (Author)

AD-285 855 Div. 20
(TISTP/WH) OTS price $1.60

Naval Research Lab., Washington, D. C.
RANGE-ENERGY RELATIONS FOR PROTONS AND ELECTRONS IN Al, Si, AND SiO2.
Final rept.,
by V. J. Linnenbom. 28 Sep 62, 12p. incl. illus. tables, 11 refs. (NRL rept. no. 5828)
Unclassified report

DESCRIPTORS: *Protons, *Electrons, *Penetration, *Silicon, *Silicon compounds, *Dioxides, *Energy.

Range-energy relationships for protons penetrating silicon and quartz are presented for the energy region 100 kev to 100 Mev. The range of protons in Si is obtained from range data in Al, corrected by the inverse mass stopping power ratio of the two elements. Low energy data (100 kev to 1 Mev) for Al are recalculated by graphical integration of the reciprocal mass stopping power curve. Ranges in Al for protons greater than 1 Mev in energy are taken from the literature. The data for SiO2 are calculated from data on Si and gaseous O2, based on Bragg's rule that the stopping power of a compound is equal to the sum of the contributions made by the individual atoms of the compound. To complete the picture, range-energy relationships for electrons are also presented. (Author)

AD-285 975 Div. 20, 15
(TISTP/MS) OTS price $4.60

RAND Corp., Santa Monica, Calif.
A METHOD OF COMPUTING THE DISTRIBUTION FUNCTION OF RADIOACTIVE DOSES FROM MULTIPLE NUCLEAR DETONATIONS,
by E. S. Batten. Sep 62, 43p. incl. illus. table, 6 refs. (Memo. no. RM-3189-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Radioactive fallout, *Dose rate, *Mathematical prediction, Statistical analysis, Mathematical analysis, Functions, Wind, Measurement.

Present methods of predicting fallout can estimate the contamination resulting from a multibomb campaign in an extensive area by applying the random bomb-drop technique or by computing the fallout for a given set of targets and wind patterns. For multiple targets near population centers, we need a new computational method that can be applied to a small geographical area and that will account for the overlapping of fallout patterns encountered in a variety of wind conditions. A possible method is presented, developed, and applied to a typical target system. The limitations imposed by uncertainties in the initial assumptions are also discussed. (Author)

AD-286 010 Div. 20
(TISTP/WH) OTS price $1.60

Pennsylvania U., Philadelphia, Pa.
(No title).
Final rept.,
by K. N. Geller. June 62,
(Contract Nonr 55117)
Unclassified report

DESCRIPTORS: *Betatrons, *Calibration, *Photonuclear reactions.

This report includes:
SYSTEM FOR ENERGY CONTROL AND ABSOLUTE CALIBRATION OF A23 MEV BETATRON. by K. N. Geller.

FINE STRUCTURE IN THE PHOTONEUTRON CROSS SECTIONS OF OXYGEN AND CARBON. by K. N. Geller and E. G. Muirhead.

The theoretical and technical features of a system used to determine and control the operating energy of a 23 Mev betatron are described. By observing the variation in orbit radius as a function of magnet excitation, we are able to

predict the shape of the calibration curve to maximum operating energy. Although an absolute calibration of the predicted energy scale is possible, the present calibration is empirical and based on only the 16.22 Mev resonance in the O-16 (gamma, n) O-15 reaction. Photoneutron threshold energies based on the present energy scale are in good agreement with accepted values. (Author)

AD-286 024 Div. 20
(TISTP/WH) OTS price $2.60

Armour Research Foundation, Chicago, Ill.
A NUCLEAR-PHOTON ENERGY CONVERSION STUDY.
Quarterly technical rept. no. 2, 1 July-30 Sep 62,
by H. V. Watts and S. Nudelman. 9 Oct 62, 20p. incl. illus. 10 refs. (Rept. no. ARF 1214-TR 2) (Contract AF 33(657)8527)
Unclassified report

DESCRIPTORS: *Photons, *Photoelectric cells, *Silicon, *Radioactive isotopes, *Phosphors, *Gamma rays, *Beta particles.

The characteristics of silicon p-n junction photovoltaic cells were experimentally studied to determine their operational properties for use in a nuclear-photon energy conversion system. Beta particles from a radioisotope source are absorbed by a luminescent material which emits a multiplicity of low energy photons. These photons are converted to electrical energy by a photovoltaic device. Gamma radiation from Co-60 produced a significant efficiency loss above 100,000 roentgens. The silicon cell efficiency was observed to decrease nearly linearly with increased temperature in the range of 25 to 180 C at a rate of about 0.65% per degree centigrade. A marked efficiency decrease at low illumination intensities, which is expected from the beta excited phosphor, was observed for the silicon cell tested. (Author)

AD-286 110 Div. 20, 25
(TISTM/SJR) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A STUDY OF HEAT ABSORPTION BY LIQUID METAL IN A CHANNEL OF RECTANGULAR CROSS SECTION,
by V. I. Subbotin, S. P. Kaznovskiy, and V. I. Sidorov. 7 June 62, 16p. incl. illus. 8 refs. (Trans. no. FTD-TT-62-714 from Teploenergetika, No. 9, pp. 68-72, 1961)
Unclassified report

DESCRIPTORS: *Nuclear power plants, *Coolants, *Heat transfer, Liquid metals, Mercury, Thermodynamics, Heat, Absorption.

Russian research on heat absorption by mercury, for possible use as a coolant in a nuclear power reactor is reported. Mathematical treatment of the heat transfer data is based on Nusselt and Peclet numbers for unilateral and bilateral heat input. Agreement between calculated and experimental data is good, but the authors point out that generalizations are premature, since theoretical calculations pertain to heat transfer in flat channels of infinite width, with constant wall temperature, while in a rectangular channel of finite width they found that the wall temperature along the width of the channel was noticeably non-uniform.

AD-286 185 Div. 20
(TISTE/CAM) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
REVERSIBLE OBSERVATION SYSTEM FOR REMOTE TRANSMISSION OF FORCES AND DISPLACEMENTS,
by B. G. Sirazitdinov and D. I. Zubkov. 21 June 62, 27p. incl. illus. (Trans. no. FTD-TT-62-531 from Pribory Avtomatiki i Vychislitel'noy Tekhniki, pp. 34-40, 1961)
Unclassified report

DESCRIPTORS: *Remote control systems, *Arms, *Synchros, Machines, Electric motors, Direct current, Handling, Moments, Stresses, Mathematical analysis, Differential equations, Automatic.

A number of manufacturing operations require the use of devices which imitate and extend the hands of a man. Such devices - manipulators - must possess a corresponding number of degrees of freedom. The results are discussed of the development of a model of one of the possible versions of a reversible observing system, intended for electric arms (electromechanical manipulators) to act as their degrees of freedom. Some of the results are investigated of the development of the reversible observing system which forms the basic element of the electromechanical manipulator. (Author)

AD-286 188 Div. 20
(TISTP/TL) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A SURVEY OF METHODS OF CALCULATING NUCLEAR REACTORS,
by G. I. Marchuk. 12 June 62, 37p. 80 refs. (Trans. no. FTD-TT-62-663 from Atomnaya Energiya, 11:4, pp. 356-369, 1961)
Unclassified report

DESCRIPTORS: *Nuclear power plants, Computers, Numerical analysis, Difference equations, Integral transforms, Partial differential equations.

AD-286 341 Div. 20
(TISTP/GRW) OTS price $1.10

Aerospace Information Div., Washington, D. C.
DETECTION AND MEASUREMENT OF RADIOACTIVE FALLOUT.
22 Aug 62, 2p. (AID rept. no. 62-124; Trans. from Belyayev, L. I., L. I. Gedeonov, V. P. Shvedov, and A. A. Yuzefovich. Intensivnoye radioaktivnoye vypadeniye v Simeize (krym) v rezul'tate yadernogo vzryva v Sakhare 13 fevralya 1960 g. (Intensive Radioactive Fallout in Simiz (Crimea) as a result of the Nuclear Explosion in the Sahara on 13 February 1960), Moskva, TD883.R83, 39p. 1961)
Unclassified report

DESCRIPTORS: *Nuclear explosions, *Radioactive fallout, Detection, Measurement, Desert tests, Fission products.

AD-286 631 Div. 20, 25
(TISTP/WH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
EXAMINATION OF HEAT TRANSFER PROCESSES IN HEAT-PRODUCING ELEMENTS OF NUCLEAR REACTORS BY METHOD OF HYDRAULIC MODELLING,
by O. I. Yaroshevich. 20 Aug 62, 9p. incl. illus. (Trans no. FTD-TT-62-1068 from Inzhenerno Fizicheskii Zhurnal 3:5, pp. 81-85, 1960)
Unclassified report

DESCRIPTORS: *Nuclear power plants, *Reactor cores, *Heat transfer, *Uranium, *Thermodynamics, USSR, Hydraulic models.

Methods and results of examining the unsteady temperature fields of heat-producing elements

(HPE) of water-moderated, water-cooled nuclear reactors are treated. By means of hydraulic modelling, temperature fields of HPE were found, taking into account the variation in the heat conduction coefficient of HPE materials with temperature, changes in dimensions of HPE on heating, and the effect of the negative temperature coefficient of reactivity. (Author)

AD-286 632 Div. 20
(TISTP/WH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ONE ASYMPTOTIC LAW IN THE THEORY OF NEUTRON MODERATION,
by M. V. Maslennikov. 20 Aug 62, 8p. 8 refs. (Trans. no. FDT-TT-62-1045 from Zhurnal Vychislitel'noy Matematiki i Matematicheskoy Fiziki 1:6, pp. 1136-1139, 1961)
Unclassified report

DESCRIPTORS: *Homogeneous reactors, *Reactor kinetics, *Reactor moderators, *Neutron cross sections, USSR.

An examination is made of the problem of the energy-time distribution of neutrons in a homogeneous moderator which fills an entire space whose nuclei are stationary and have mass M (the mass of a neutron is taken as unity). The state of a neutron is defined by assigning the point (u, t), where t is time, and u is the lethargy of the neutron; $(u, t) \in D$, $D = \{(u, t)\ u > 0,\ t > 0\}$. It is assumed that neutrons can be captured and scattered by the nuclei of the moderator; scattering is elastic and isotropic in the center-of-mass system of the neutron and nucleus. (Author)

AD-286 665 Div. 20, 4
(TISTM/EJH) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
THE RADIATION CHEMISTRY OF LIQUID DINITROGEN TETROXIDE,
by T. C. Castorina, A. O. Allen and E. R. Johnson. 1962, 11p. incl. illus. tables, 5 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Nitrogen compounds, *Tetroxides, *Radiochemistry, Gamma rays, Radiation effects, Temperature, Dosage, Gases, Liquefied gases, Dissociation, Chemical reactions, Oxygen, Nitrogen, Mass spectroscopy.

Radiolysis of liquid dinitrogen tetroxide by cobalt-60 gammas was investigated under varying parameters of temperature, dose and gas to liquid volume ratios. The radiolytic yield based on the volume of (N2) STP is independent of temperature over the range of 0 to 30 C. A variation of the volume of N2O4 gas to volume of N2O4 liquid produces no change in the G(N2). N2O4 liquid is relatively radiation resistant with a total G value with respect to 0.5N2O:1N2:2.2502= 0.293, at post irradiation thermal equilibrium. The post irradiation evolution of oxygen has an apparent time and temperature dependency comparable to the rate of dinitrogen pentoxide in N2O4 liquid solution. The amount of thermally produced oxygen corresponds to the value expected from the complete dissociation of N2O4. Except for an induction period, a steady state concentration of N2, N2O and O2 exists from 15 to 55 mega rads. As a working hypothesis a mechanism is proposed for the gamma radiolysis of N2O4 liquid.

AD-286 722 Div. 20
(TISTP/WH) OTS price $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
QUALITY CONTROL FOR THE GAMMA-RAY SCINTILLATION SPECTROMETER,
by D. F. Covell. 17 Sep 62, 26p. incl. illus. 10 refs. (NRDL-TR-584)
Unclassified report

DESCRIPTORS: *Scintillation counters, *Pulse height analyzers, *Gamma ray spectra, *Calibration, *Gamma ray spectrometers, *Quality control.

Fluctuations, drifts or performance abnormalities in the scintillation gamma-ray spectrometer may completely invalidate its calibration and, under any circumstance, will lessen its precision of measurement. A technique patterned after well-established methods of quality control was found to be effective in significantly reducing drift and in providing a continuous evaluation of spectrometer performance. An additional benefit in applying this technique was the gradual improvement in instrument reliability with a resultant reduction in the requirement for special maintenance. (Author)

AD-286 738 Div. 20
(TISTP/WH) OTS price $9.10

Technical Operations, Inc., Burlington, Mass.
GAMMA DOSE RATE FROM NEUTRON-INDUCED ACTIVITY IN THE EARTH,
Final rept.,
by Samuel S. Holland, Jr., and Raymond Gold. 15 Oct 62, 107p. incl. illus. tables (Rept. no. TO-B 62-64)
(Contract DA 18-108-405-cml-1032)
Unclassified report

DESCRIPTORS: *Soils, *Dose rate, *Radioactive isotopes, *Neutron flux density, *Gamma emission, Neutron capture.

Calculations of dose rate vs time due to neutron-induced radioactivity in the earth are presented. Calculations are performed under conditions of plane symmetry for neutron source energies of 14 Mev, 9.89 Mev, and 0.025 ev (thermal) for three different soil compositions and two water contents. Dose rate vs time curves are given for the period between 2 min and 140 min after irradiation. (Author)

21. NUCLEAR PROPULSION

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22. ORDNANCE

AD-285 688 Div. 22
(TISTW/JRG) OTS price $3.60

Naval Ordnance Lab., White Oak, Md.
PHOTOGRAPHIC STUDIES OF GROWTH OF EXPLOSION,
by Howard S. Leopold. 13 July 62, 28p. incl. illus. table, 11 refs. (Rept. no. NOLTR 62-86)
Unclassified report

DESCRIPTORS: *Explosions, *Rotating mirror cameras, Silver compounds, Lead compounds, Azides, Styphnates, PETN, Wire, Energy, Photographic analysis.

A rotating mirror smear camera technique is described for observing the growth of explosion in silver azide, lead azide, lead styphnate, and PETN when initiated by a Nichrome wire. Energy was delivered by discharging through the wire a one microfarad capacitor charged to preselected potentials of 100, 500, and 2,000 v. The wire explodes at the 500- and 2,000-v potentials. The time from the beginning of the input pulse to time of explosion was a function of the potential, and consequently, the power and energy as well. (Author)

AD-286 047 Div. 22
(TISTW/PCR) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
A MODEL FOR EVALUATING SURFACE-TO-SURFACE FIREPOWER,
by Otis S. Spears. 1962, 18p. incl. illus. 3 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, United States Military Academy, West Point, New York.

DESCRIPTORS: *Weapons, Mathematical analysis, Equations, Range, Mobile, Reliability, Surface targets, Mathematical prediction, Casualties, Guided missiles (Tactical), Effectiveness, Surface-to-surface.

A method for the determination of overall weapons effectiveness is outlined for surface-to-surface tactical missions. The basic tactical factors involved are: accuracy, lethality, rate of fire, weight, range, mobility, reliability, and size and nature of target. These factors are interwoven in such a manner as to yield an overall measure of tactical effectiveness. Each weapon is considered as being potentially a single weapon, a portion of a tactical unit, or an element of a whole force structure. Essentially, force structure capabilities are calculated for a set of subdivisions of the battlefield. Certain typical deployments are shown, and results of certain recent evaluations are given, as examples. The model is useful as a means of determining the most significant and effective tactical deployments, as well as for determining weapons requirements. (Author)

AD-286 082 Div. 22
(TISTW/PCR) OTS price $1.10

Magnavox Co., Urbana, Ill.
SOLID-STATE ARM SAFE DEVICE.
Monthly progress rept. no. 7, 1 July-1 Aug 62, by L. W. Ricketts. 6 Aug 62, 3p.
(Contract DA 11-022-ORD-4048)
Unclassified report

DESCRIPTORS: *Arming devices, *Safety devices, Solid state physics, Configuration, Power supplies, Electric switches, Guided missile warheads, Guided missiles (Tactical).

AD-286 083 Div. 22
(TISTW/PCR) OTS price $1.10

Magnavox Co., Urbana, Ill.
SOLID-STATE ARM SAFE DEVICE.
Monthly progress rept. no. 8, 1 Aug-1 Sep 62, by L. W. Ricketts. 4 Sep 62, 4p.
(Contract DA 11-022-ORD-4048)
Unclassified report

DESCRIPTORS: *Arming devices, *Safety devices, Solid state physics, Configuration, Power supplies, Electric switches, Guided missile warheads, Guided missiles (Tactical).

AD-286 272 Div. 22, 30
(TISTW/JRG) OTS price $4.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
RESEARCH IN TRACE ANALYSIS OF ULTRA-PURE EXPLOSIVES. PART I - LITERATURE SURVEY,
by Stanley Semel. Feb 62, 42p. incl. tables, 57 refs. (Technical memo. 1074)
Unclassified report

DESCRIPTORS: *Bibliography, *Explosives, *Chemical impurities, *Chemical analysis, Microchemistry, Paramagnetic resonance, Mass spectroscopy, Absorption, Light, Flames, Photometers, Sensitivity, Analysis, Detection.

The results of an extensive literature search for instrumental techniques having sensitivities of less than 1 ppm applicable to explosives research are presented. Information was also gathered by personal contact with investigators in the field of trace analysis. The techniques discussed are atomic absorption, light absorption, activation analysis, electron paramagnetic resonance, mass spectrometry, optical emission and flame photometry. Tables of sensitivities are included for each technique as well as comparisons of the techniques discussed to permit the reader to appreciate the sensitivity relationships. Parameters affecting the detection of cations and some anions are included. (Author)

AD-286 397 Div. 22, 15
(TISTP/MS) OTS price $1.60

Mathematical Research Center, U. of Wisconsin, Madison.
EXISTENCE AND UNIQUENESS OF FLOWS BEHIND THREE-DIMENSIONAL STATIONARY AND PSEUDO-STATIONARY SHOCKS,
by Ram P. Kanwal. Sep 57, 12p. 6 refs. (MRC Technical summary rept. no. 9)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Shock waves, *Tensor analysis, Functions, Equations.

An attempt was made to show that the integration of the various conservation equations is equivalent to the solution of a Cauchy problem with the shock front as surface on which the initial data is given. By Cauchy-Kowaleski theorem it is proved that in a neighborhood of the shock the flow behind the shock exists and is uniquely

determined. The paper is divided into two parts. The first part deals with the stationary flows, while the second part deals with the pseudo-stationary flows. The detailed analysis is given only for the stationary flows. Formal methods of tensor analysis are used throughout the paper. (Author)

AD-286 501 Div. 22
(TISTW/JRG) OTS price $2.60

Naval Ordnance Lab., White Oak, Md.
THE GROWTH TO DETONATION OF LOW DENSITY EXPLOSIVE MIXTURES,
by Howard S. Leopold and D. McVaney. Sep 62, 20p. incl. illus. tables, 4 refs. (Rept. no. NOLTR 62-89)
Unclassified report

DESCRIPTORS: *Mixtures, *Explosives, *Detonation, *Explosions, Lead compounds, Silver compounds, Aluminum, Styphnates, Azides, PETN, Photographic analysis, Rotating-mirror cameras, Electric detonators, Design, Velocity, Propagation.

The growth to detonation of normal lead styphnate-lead azide, normal lead styphnate-silver azide, normal lead styphnate-PETN, silver azide-PETN, and normal lead styphnate-flake aluminum mixtures was observed using a rotating mirror smear camera. Normal lead styphnate-lead azide mixtures (75/25 to 25/75 proportions) retain the hot-wire sensitivity of the normal lead styphnate and develop a terminal detonation velocity characteristic of the lead azide. Normal lead styphnate-PETN mixtures propagate slower than normal lead styphnate alone. Silver azide-PETN mixtures develop a terminal detonation velocity characteristic of PETN. (Author)

AD-286 510 Div. 22
(TISTW/JRG) OTS price $1.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
SIMULTANEITY OF EXPLOSION TIMES OF ENGINEER'S SPECIAL DETONATORS,
by E. Bonner, L. Bryant and J. Trimble. Aug 62, 16p. incl. illus. tables, 5 refs. (BRL technical note no. 1470)
Unclassified report

DESCRIPTORS: *Electric detonators, Wire, Explosions, Firing circuits, Test methods, Detonators, Time, Control, Detonation.

It was shown that a group of 25 Engineer's special electric detonators can be detonated simultaneously with an average time delay of 2.2 microsec. and a standard deviation of 1.4 microsec. by an 8-9 kv pulse, provided internal arcing is prevented. If internal arcing occurs, these time delays may be an order of magnitude higher. (Author)

AD-286 639 Div. 22
(TISTW/JRG) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
AIR BLAST PHENOMENA IN AN ARCTIC CLIMATE,
by L. F. Ingram. 1962, 9p. incl. illus.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, New York.

DESCRIPTORS: *TNT, *Explosions, *Blast, Explosives, Shock waves, Pressure, Snow, Time, Measurement, Energy, Absorption, Reflection, Greenland, Detonation, Arctic regions.

In 1960, 4- and 32-lb TNT spheres were fired at scaled burst heights over natural and processed snow on the Greenland Ice Cap at Camp Fistclench where the snow cover is 100 ft deep. Air-blast pressure-time measurements were made at the surface to obtain height-of-burst information and at several elevations above the surface to determine Mach-triple-point loci. Surface pressure measurements were made at reduced horizontal distances. Pressure data were obtained for the range 2- to 100-psi peak overpressure. Results show that: (a) considerable energy is absorbed by snow; (b) snow cannot be regarded as an ideal reflecting medium; and (c) the Mach stem formation over snow is not essentially different from that over a rigid boundary. (Author)

AD-286 651 Div. 22
(TISTW/PCR) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
NUCLEAR TIMING,
by Raymond H. Comyn and Maurice Apstein. 1962, 17p. incl. illus. tables, 11 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Time interval counters, Radioactive isotopes, Alpha particles, Detectors, Amplifiers, Discriminators, Timing circuits, Americium, Plutonium, Scintillation counters, Proportional counters, Geiger counters, Solid state physics, Proton counters, Diodes, Silicon, Gold, Electronic circuits, Nuclear energy.

A timer which operates on nuclear emission is being developed for ordnance use. It consists of four parts: a radio-active source which emits alpha particles at a predictable average rate; a detector to convert the nuclear pulses into electrical pulses; an amplifier and discriminator to amplify the pulses and separate them from electrical noise; and a binary system to count the pulses and indicate when a definite cumulative output has been attained at the end of the predetermined time period. Americium 241 presently is used as the alpha source. It is readily obtained, has a half life of 475 years, and its low level gamma radiation can be shielded easily. Plutonium 239 has similar characteristics except for a half life of 24,100 years. Its use is recommended when long term storage stability is required. Silicon p-n diodes are used as detectors. These are small and operate on low voltage power supplies. Since they do not respond readily to beta, gamma, or cosmic radiation, the timer will not be influenced by extraneous radiation. (Author)

AD-286 660 Div. 22, 17
(TISTW/PCR) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
APPLICATION OF THE PRINCIPLES OF FRACTURE MECHANICS TO RECOILLESS RIFLE PROBLEMS,
by Carl M. Carman. 1962, 13p. incl. illus. tables, 5 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Recoilless rifles, *Fracture (Mechanics), Mathematical analysis, Equations, Fatigue (Mechanics), Deformation, Steel.

The basic mathematical model on which fracture mechanics is founded is discussed in some detail. This model assumes infinite strain elasticity, and the crack or flaw is regarded as an interior free surface in an elastic solid. In terms of this model, the force conjugate to speed of crack extension is the rate of dissipation of strain energy termed G. Experimental equipment for measuring the crack resistance of a material as the crack extends from a starting notch or fatigue crack is described. The equipment furnishes values of crack extension as a function of stress in which the actual crack plus its associated inelastic deformations are analyzed as equivalent crack length. (Author)

AD-286 714 Div. 22, 18, 23
(TISTW/JRG) OTS price $2.60

Tactical Air Command, Langley Air Force Base, Va.
OPERATIONAL TEST AND EVALUATION - NIGHT MARKING CAPABILITY OF THE MK-76, MK-106 AND MB-2 BOMBS,
by Joseph L. Hutto, Frederick C. Kyler and others. Oct 62, 21p. incl. illus. tables (Rept. no. TAC-TR-62-33)
Unclassified report

DESCRIPTORS: *Practice bomb signals, *Night bombing, *Spotting charges, *Bombs, *Smoke signals, *Flares, Pyrotechnics, Signals, Training, Pilots, Aviation personnel, Position finding, Training ammunition, Tests.

The Mark 4 Mod 3 spotting charge was designed for daylight marking and, when employed at night with the MK-76, MK-106, MB-2 and MB-2A bombs, will have limited use for determining bomb scores. Because of the short duration of the flash, and since the smoke is not visible at night, the delivery pilot cannot accurately air score his own night bombing impacts with acceptable consistency. A wingman or another pilot orbiting above the target can satisfactorily score bomb drops at night if a method for determining range is provided. Ground personnel can score night bombing impacts but with less accuracy than a pilot orbiting above the target. Ground scoring personnel must be constantly alert during bombing maneuvers in order to see the bomb flash and align the alidade before the after-image of the flash has disappeared. (Author)

AD-286 790 Div. 22
(TISTP/MS) OTS price $3.60

Frick Chemical Lab., Princeton U., N. J.
ENERGY EXCHANGE IN SHOCK AND DETONATION WAVES,
by D. F. Hornig. 20 Oct 62, 20p. illus. 30 refs. (Technical rept. no. 4)
(Contract Nonr-185824, Proj. NR 061-041)
Unclassified report

DESCRIPTORS: *Detonation waves, *Energy, *Shock waves, *Shock, *High temperature research, Heat transfer, Gas flow, Motion, Rotation, Velocity, Diffusion, Reflection, Theory, Light pulses, Measurement, Partial differential equations, Gases, Exchange reactions, Detonation.

In shock waves with strengths and final temperatures equivalent to those in detonations, translational and rotational equilibrium is reached in the initial compression process, i. e. in 10-20 collisions. Vibrational relaxation was not well studied at the temperatures appropriate to detonation but are certainly much slower, of the order of hundreds or thousands of collisions. On the basis of model calculations, the main part of the heat evolution in hydrogen-oxygen detonations occurs later. All of this supports the ZND model of a gaseous detonation. No signal was observed which could be shown to originate in reflection from the initial compression in H2 + 3O2 detonations. Rather, the observed signal seemed to be caused by scattering from a zone extending about 2.5 mm back into the detonation wave. This observation is consistent with the observation by White and others of a complex wave structure and possibly turbulence in detonations at low pressure. Such structure or turbulence persists up to several atmospheres initial pressure. In that case the properties of detonations may be largely affected by turbulent heat transfer rather than molecular relaxation processes. (Author)

AD-286 817 Div. 22, 6
(TISTW/RD) OTS price $5.60

Air Proving Ground Command, Eglin Air Force Base, Fla.
DESIGN STUDY OF A REFLECTING CONE INFRARED SCORING METHOD,
by William F. Grieder. Oct 62, 48p. incl. illus. 5 refs. (Rept. no. APGC TDR 62-53)
(Proj. 7844W1)
Unclassified report

DESCRIPTORS: *Firing error indicators, *Infrared detectors, *Guided missiles, *Rockets, Design, Conical bodies, Reflection, Infrared radiation, Interception probabilities.

The design criteria and the miss distance scoring capability of an infrared radiation detection technique are evaluated. The technique employs two detectors and a reflecting cone optical system to provide the 360 degrees viewing geometry necessary for scoring. The study includes basic design considerations for the reflecting cone optics and associated detection circuitry. Effects of source strength, missile trajectory, and background on scorer performance are considered. A prototype optical unit and preamplifier were fabricated to confirm the optical analysis and determine system detection performance. Laboratory test results indicate that missile scoring can be accomplished with the prototype unit out to miss distances of 2340 ft for a space background and typical missile exhaust plume sources. In a clear sky air environment, scoring is possible out to 321 ft. Before optimization or additional development of the system is attempted, scoring accuracy field tests should be conducted with the prototype unit using projectiles such as tracer and/or 5-in. HVAR munitions. (Author)

AD-286 860 Div. 22
(TISTW/JRG) OTS price $1.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
THE LATERAL MOTION OF A 175MM GUN TUBE PRODUCED BY AN ECCENTRIC PROJECTILE,
by A. S. Elder. July 62, 20p. 6 refs. (BRL memo. no. 1418)
Unclassified report

DESCRIPTORS: *Gun barrels, Equations, Vibration, Mathematical analysis, Projectiles, Errors, Terminal ballistics, Aerodynamics, Helixes, High explosive ammunition, Exterior ballistics, Propelling charges, Motion.

The lateral motion of a 175mm gun tube produced by firing a T203E2 HE shell with an effective eccentricity of 0.01 in. was calculated for Zones 1, 2, and 3. The displacement in the point of impact caused by this motion increases stead-

ily with muzzle velocity, ranging from 0.6 mil for Zone 1 to 1.1 mils for Zone 3. Differential effects caused by small variations in the muzzle velocity were calculated for Zone 2. This lateral motion is not the cause of the abnormal dispersion that had been observed when firing Zone 1 charges. The changes in the point of impact caused by throw-off and aerodynamic jump were also calculated. The total changes in the point of impact due to these causes and the motion of the tube ranges from 1.1 mils for Zone 1 to 1.7 mils for Zone 3. (Author)

AD-286 878 Div. 22
(TISTW/JRG) OTS price $3.60

Pitman-Dunn Labs. Group, Frankford Arsenal, Philadelphia, Pa.
DEVELOPMENT OF FUZE, MT, T252,
by J. Fazio. Aug 62, 29p. incl. illus. tables.
(Rept. no. R-1628)
(Proj. 505-07-008)
Unclassified report

DESCRIPTORS: *Time delay fuzes, *Mortar fuzes, *Illuminating projectiles, Operation, Tests, Design, Fuzes.

The MT, T252 fuze is a 45-second mechanical time fuze designed to initiate the M29 percussion primer which in turn ignites the explosive train of the T214 illuminating shell. The fuze provides safety, arming, timing and firing systems to permit firing at selective time settings. Two sources were explored to provide a self-contained light source for night setting. (Author)

23. PERSONNEL AND TRAINING

AD-285 809 Div. 23
(TISTB/AW) OTS price $10.50

Bureau of Naval Personnel, Washington, D. C.
ABSTRACTS OF RESEARCH REPORTS.
June 62, 133p. (Technical bull. no. 62-6, supersedes AD-239 893)
Unclassified report

DESCRIPTORS: *Job analysis, *Military psychology, *Naval personnel, Achievement tests, Aptitude tests, Intelligence tests, Personality tests, Psychomotor tests, Vocational tests, Maintenance personnel, Officer personnel, Recruiting, Sonar personnel, Women, Classification, Naval research, Selection, Electronic equipment.

AD-285 842 Div. 23
(TISTB/AW) OTS price $9.60

Human Factors Research, Inc., Los Angeles, Calif.
FACTORS INFLUENCING THE USE OF PRACTICAL PERFORMANCE TESTS IN THE NAVY,
by Douglas Harris and Robert R. Mackie. Aug 62, 108p. incl. illus. tables (Technical rept. no. 703-1)
(Contract Nonr-344400)
Unclassified report

DESCRIPTORS: *Vocational tests, *Achievement tests, *Military training, Effectiveness, Attitudes, Acceptability, Naval personnel, Naval operations.

The status of practical performance testing in the Navy as it existed in the first part of 1962 is described. Practical performance tests are being used to a more limited extent than would be predicted from the positive attitudes found among operating supervisors and school instructors toward the desirability of performance testing. The primary problem in implementing the use of performance tests becomes not one of selling the idea of their value, but one of overcoming the practical barriers limiting their feasibility. The problem of feasibility can be resolved by either changing the environment in which tests are to be used, or by developing tests acceptable and usable in the existing environment, or both. Resolving the problem by providing practical performance tests 'packaged' to be acceptable and usable in the existing environment, while at the same time maintaining adequate standards of test reliability and validity, is a formidable challenge for the test developer. If it is difficult to meet this challenge within the constraints imposed by the training environment, it will be considerably more difficult to meet it within those imposed by the operating environment. (Author)

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

AD-286 052 Div. 24, 18, 23
(TISTA/VGW) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
TECHNIQUES FOR OPTIMIZING IMAGE INTERPRETER PERFORMANCE,
by Robert Sadacca. 1962, 14p. incl. illus. tables.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, United States Military Academy, West Point, New York.

DESCRIPTORS: *Photo interpretation, *Aerial reconnaissance, *Conferences, Job analysis, Military personnel, Effectiveness, Photographic intelligence, Aerial photography, Errors, Training, Psychology.

Output of an aerial reconnaissance system can be evaluated in terms of the timeliness, relevancy, completeness, and accuracy of intelligence information produced. However, examination of identifications made by image interpreters studying real imagery revealed that these criteria are not necessarily congruent. Optimizing performance from the standpoint of one criterion resulted in decrements in another criterion. Several studies designed to develop approaches for optimizing interpreter performance under all four criteria are described. These approaches focussed on variations in (1) degree of confidence interpreters express in their identifications, (2) viewing time periods, (3) repeated exposures to imagery, and (4) team procedures. In all studies, the experimental variation in technique resulted in the hypothesized increments in performance. Examples: By accepting only identifications of which interpreters were highly confident, percent accuracy of tactical identifications was more than doubled; in one team work procedure, the amount of correct information produced was almost double that produced by interpreters working alone. (Author)

Division 24 - PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

AD-286 099 Div. 24, 2
(TISTA/VGW) OTS price $1.60

Saskatchewan U. (Canada).
EXPERIMENTS WITH MONOCHROMATIC ALL-SKY CAMERAS, by D. Ramsden. Nov 60, 14p. illus. 15 refs.
(Scientific rept. no. CR-3)
(Contract AF 19(604)7265)
Unclassified report

DESCRIPTORS: *Astronomical cameras, *Motion picture cameras, *Optical systems, Twilight, Night sky, Sky brightness, Monochromatic light, Aurorae, Interferometers, Spectrographic cameras.

Several optical systems for observing monochromatic emissions with an all-sky camera are described and discussed. They were tested at wavelengths of 6300, 5577, and 3914 A and should also be useful at 5893 A. They appear capable of gathering useful data but with ordinary fast films require exposures of half an hour or more. New films with tenfold greater speed may reduce this limitation. A preliminary investigation of twilight fluorescence in the 3914 A band of N2(+) suggests that it is only present during auroral activity. (Author)

AD-286 488 Div. 24
(TISTW/RD) OTS price $3.60

Itek Corp., Waltham, Mass.
STUDY OF IMAGE-EVALUATION TECHNIQUES. Interim engineering rept. no. 1, 10 July-10 Oct 62,
by G. C. Brock, W. L. Attaya, and E. P. Myskowski. 10 Oct 62, 27p. incl. illus.
(Rept. no. Itek 9048-1)
(Contract AF 33(657)9158)
Unclassified report

DESCRIPTORS: *Aerial photography, *Aerial reconnaissance, Aerial photographs, Photographic film, Photographic analysis, Photographic emulsions, Simulation.

A study is presented of image evaluation for reconnaissance photography. Among the objectives are: (1) to assess the possible advantages of new concepts such as modulation transfer function, and how far they can replace resolving power for system evaluation and specification; (2) to examine questions of accuracy and convenience concerning the new measurement techniques; and (3) to establish criteria for the detection of targets of specific shape and contrast. Research included preparation for laboratory simulation of aerial photography, including a study of the problems of realistic simulation by transparencies; simulated photography with various transfer functions; studies in system analysis; initial measurements of lens transfer functions; and emulsion threshold modulations. (Author)

25. PHYSICS

AD-285 601 Div. 25
(TISTP/TL) OTS price $1.60

Brown U. Div. of Applied Mathematics, Providence, R. I.
UNIQUENESS IN THE THEORY OF THERMO-RHEOLOGICALLY SIMPLE ABLATING VISCOELASTIC SOLIDS,
by Eli Sternberg and M. E. Gurtin. Sep 62, 19p. 13 refs. (Technical rept. no. 16)
(Contract Nonr-56225, Proj. NR 064-431)
Unclassified report

DESCRIPTORS: *Solids, *Elasticity, *Ablation, Thermal stresses, Integral equations, Partial differential equations, Transformations (Mathematics).

The present analysis aims at a twofold extension of Volterra's uniqueness theorem: first, to bring within its scope problems concerning thermal stresses in thermo-rheologically simple viscoelastic materials; second, to encompass the possibility of surface ablation. The relevant uniqueness theorem is arrived at, along with the class of boundary value problems that are studied. (Author)

AD-285 602 Div. 25, 15
(TISTP/WH) OTS price $1.60

Brown U. Div. of Applied Mathematics, Providence, R. I.
A RECIPROCAL THEOREM IN THE LINEAR THEORY OF ANISOTROPIC VISCOELASTIC SOLIDS,
by M. E. Gurtin and Eli Sternberg. Sep 62, 12p. 7 refs. (Technical rept. no. 17)
(Contract Nonr-56225, Proj. NR 064-431)
Unclassified report

DESCRIPTORS: *Solids, *Elasticity, *Viscosity, *Tensor analysis, Theory.

AD-285 620 Div. 25
(TISTP/MS) OTS price $4.60

Elcon Lab., Inc., Watertown, Mass.
STUDY OF TECHNIQUES FOR A HIGH POWER, FAST WAVE PLASMA AMPLIFIER.
Quarterly interim engineering rept. no. 1,
by E. Langberg, R. L. Smith, and P. Freyheit. 20 Aug 62, 45p. incl. illus. refs. (Rept. no. R-8-62-3)
(Contract AF 33(657)8852)
Unclassified report

DESCRIPTORS: *Plasma physics, *Amplifiers, Wave transmission, Electron beams, Mathematical analysis, Microwave amplifiers.

Two processes are described which may lead to low pressure fast-wave plasma amplification: the cyclotron mode and the new beam scatter mode. A comparison of the two leads to a recommendation that the beam scatter mode be emphasized. The behavior of an electron beam in a low pressure gas is examined and the formulas for the equivalent inductance and conductance are derived. The conditions for power gain are related to beam and gas properties. A plasma device is described in which the required beam can be generated. It consists of electron emitting hot cathode and cesium ion emitting hot anode. The potential distribution and space charge neutralization are discussed. The effective capacitance of the cathode sheath formed at the electron emitter is evaluated. The efficiency of beam scatter amplification is described. A three electrode design is introduced in which ion emission and electron collection are performed by different electrodes. Amplification efficiency potentially higher than 30% is indicated. (Author)

AD-285 626 Div. 25
(TISTM/ODN) OTS price $2.60

Seismological Observatory, John Carroll U., Cleveland, Ohio.
SINGLE CRYSTAL ELASTIC CONSTANTS OF GALLIUM,
by N. A. Roughton and H. C. Nash. 13 Sep 62, 20p. incl. illus. tables, 7 refs. (Technical rept. no. 6)
(Contract Nonr-257701, Proj. NR 384-309)
Unclassified report

DESCRIPTORS: *Single crystals, *Gallium, Ultrasonics, Growth, Crystals, Oscilloscopes, Pulse generators, Crystal structure, Elasticity.

The single crystal elastic constants of Ga were measured at 0 C by the ultrasonic pulse-echo technique. The results in units of 10 to the 11th power dynes/sq cm are: C11-9.8, C22-8.76, C33-13.32, C44-3.42, C55-4.2, C66-3.92, C12-3.26, C23-4.23, and C13-2.76. These results are based on measurements made on four single crystal samples grown with selected orientations and varying in size up to 2.3 cm acoustic path length. The growth process is described. (Author)

AD-285 627 Div. 25
(TISTM/EJH) OTS price $4.60

Naval Ordnance Test Station, China Lake, Calif.
THREE RUSSIAN ARTICLES ON DIFFRACTION OF SLOW ELECTRONS IN GRAPHITE, ZINC, AND ALUMINUM,
by V. E. Lashkarev, E. V. Berengarten and others, tr. by Marvin E. Backman. Aug 62, 48p. incl. illus. tables, refs. (Rept. no. NOTS TP 2984; Trans. from Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki 3:6, pp. 499-509, 1933; 5:10, pp. 932-941, 1935; 9:672-680, 1939)
(NAVWEPS rept. no. 7947)
Unclassified report

DESCRIPTORS: *Electron diffraction analysis, *Graphite, *Aluminum, *Zinc, *Single crystals, Crystals, Electron beams, Electron guns, Scattering, Temperature, Voltage, Electric potential, USSR, Translation.

Diffraction of electrons in single crystals of graphite: Diffraction of slow electrons from Ceylon graphite was studied by the method of constant angles. In the interval from 6 to 150 volts, 7 maxima were found. The observations are interpreted best if the inner potential of graphite is given a constant value near 20 volts. Diffraction of slow electrons in single crystals of Zn: Studies were made according to the method of the constant angle. In the range of the normal component of electron velocity from 5.5 to 130 volts, 8 diffraction beams were measured. The equivalent inner potential of Zn was determined and found to be an asymptotically increasing function of the order of reflection. Diffraction of slow electrons in single crystals of Al: Studies show that the phenomenon of slow electron diffraction is significantly more complicated than that of fast electrons and x-rays.

AD-285 631 Div. 25, 15
(TISTM/ODN) OTS price $2.60

Mechanical Technology, Inc., Latham, N. Y.
VISCOUS SHEAR COMPRESSOR,

by E. B. Arwas and B. Sternlicht. Sep 62, 25p. incl. illus. tables, 2 refs. (Rept. no. MTI-62TR21)
(Contract Nonr-373000, Proj. NR 061-131)
Unclassified report

DESCRIPTORS: *Compressors, *Compressible flow, *Adiabatic gas flow, Air, Helium, Gases, Mathematical analysis, Shear stresses, Viscosity, Films, Thickness, Pressure.

This analysis considers a grooved-plate viscous shear compressor under polytropic flow conditions. Several special cases are treated, e.g., incompressible flow, compressible flow with adiabatic and isothermal compression. Dimensionless curves for calculation of pressure rise as a function of flow are given for: isothermal compression, adiabatic compression, monatomic gas and adiabatic compression, diatomic gas. Sample results are given for a specific size compressor operating at 24,000 RPM with four different film thicknesses, ambient pressure and temperature under isothermal and adiabatic conditions with air and helium gases. (Author)

AD-285 635 Div. 25
(TISTM/ODN) OTS price $1.60

Ohio State U. Research Foundation, Columbus.
THE INFLUENCE OF SURFACE STRUCTURE IN DISLOCATION NUCLEATION,
by J. P. Hirth. Sep 62, 15p. incl. illus. tables, 26 refs. (Technical rept. no. 2)
(Contract Nonr-49526)
Unclassified report

DESCRIPTORS: *Surfaces, *Structures, *Nucleation, Crystals, Theory, Shear stresses, Bibliography, Metallic crystals, Aluminum, Copper.

The role of surfaces, surface ledges in particular, in dislocation nucleation is considered. In the most favorable case dislocation nucleation is predicted to occur at about one-third of the theoretical strength at room temperature; at one-tenth of the theoretical strength near the melting point. The properties favoring dislocation nucleation are high surface energy, low stacking fault energy, and a vicinal surface. (Author)

AD-285 663 Div. 25, 15
(TISTP/MS) OTS price $3.60

Mathematics Research Center, U. of Wisconsin, Madison.
A TWO-BODY PROBLEM OF CLASSICAL ELECTRODYNAMICS: THE ONE-DIMENSIONAL CASE,
by Rodney D. Driver. July 62, 35p. 9 refs. (MRC Technical summary rept. no. 332)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Differential equations, *Motion, *Inequalities, Electricity.

The equations of motion for the two-body problem of classical electrodynamics can be formulated by substituting the expressions for the field of a moving charge, calculated from the Lienard-Wiechert potentials, into the Lorentz-Abraham force law. In this paper, radiation reaction is omitted and the charges are assumed to move along the x-axis. Due to the finite speed of propagation, c, of electrical effects, the differential equations involve time delays, which depend upon the unknown trajectories. Thus the equations of motion are not ordinary differential equations, and one does not determine a unique solution for t equal to or greather than t sub zero by merely specifying the positions and velocities of the charges at + sub zero. One specifies rather arbitrary initial trajectories of the two charges over some appropriate interval (alpha, t sub zero) , where alpha is less than t sub zero. Under suitable conditions, one can then show the existence of a unique extension of these trajectories which satisfy the equations of motion for all t greater than t sub zero unless and until the charges collide. It is also shown that two point charges of like sign cannot collide, while two point charges of opposite signs may or may not collide, depending upon the initial data. The effect of an external electric field in the x-direction is also considered. (Author)

AD-285 670 Div. 25, 9
(TISTP/GRW) OTS price $3.60

Guggenheim Jet Propulsion Center, Calif. Inst. of Tech., Pasadena.
PRELIMINARY STUDY OF INFRARED ABSORPTION OF WATER BEHIND INCIDENT SHOCK WAVES,
by Y. M. Timnat. Aug 62, 29p. incl. illus. tables (Technical rept. no. 40)
(Contract Nonr-22045, Proj. NR 015 401)
Unclassified report

DESCRIPTORS: *Infrared radiation, *Water vapor, *Shock waves, Infrared spectroscopy, Shock tubes, Optical systems, Absorption.

Preliminary measurements were made of effective absorption coefficients at 1/3700 cm in water vapor heated to about 1450 K. Observations were made with low spectral resolution i.e., with effective spectral slit widths varying from 1/375 to 1/1500 cm. Assuming that the water vapor was transparent in the 2.7 and 3.2 microns bands under the experimental conditions used, the sum of the integrated band intensities is 1/75 sqcm/atm. This result must be regarded as a crude lower limit since pressure broadening was inadequate and the spectral resolution too low to permit definitive measurements. (Author)

AD-285 671 Div. 25
(TISTP/WH) OTS price $1.60

Guggenheim Jet Propulsion Center, Calif. Inst. of Tech., Pasadena.
RADIATIVE ENERGY TRANSFER TO CENTRALLY LOCATED AREAS IN CYLINDRICAL AND CONICAL CHAMBERS CONTAINING ISOTHERMAL, GREY EMITTERS,
by L. D. Gray and S. S. Penner. Aug 62, 6p. illus. 4 refs. (Technical rept. no. 41)
(Contract Nonr-22045, Proj. NR 015 401)
Unclassified report

DESCRIPTORS: *Heat transfer, *Blackbody radiation, *Thermal radiation, Integral equations, Conical bodies.

The geometrical interchange factors for radiative energy transfer were evaluated for various conical configurations. A representative calculation was carried out for the radiant energy transfer to a centrally located area element at the plane of intersection between two coaxial cones. (Author)

AD-285 674 Div. 25, 4
(TISTM/TCG) OTS price $2.60

Carnegie Inst. of Tech., Pittsburgh, Pa.
LOW TEMPERATURE MAGNETIC SUSCEPTIBILITIES OF

SOME HYDRATED FORMATES OF Cu(++) AND Mn(++),
by R. B. Flippen and S. A. Friedberg. 11 Sep 62, 17p. illus. 20 refs. (Technical rept. no. 12)
(Contract Nonr-76005, Proj. NR 018-301)
Unclassified report

DESCRIPTORS: *Copper compounds, *Manganese compounds, *Formates, *Magnetic susceptibility, Hydrates, Low temperature research, Salts, Single crystals, Ferromagnetic materials, Magnetic moments, Audiofrequency, Inductance, Test methods.

The magnetic susceptibilities of powdered specimens of $Cu(HCO2)2.4H2O$, $Cu(HCO2)2.H2O$, and $Mn(HCO2)2.2H2O$ were measured by an audio frequency mutual inductance method between 1.3 and 4.2 K and from 14 to 20 K. At H temperatures, $Cu(HCO2)2.2H2O$ and $Mn(HCO2)2.2H2O$ exhibit Curie-Weiss behavior which, however, breaks down significantly in the He region. The susceptibility of $Cu(HCO2)2.4H2O$ rises to a pronounced peak at 16.8 K and is essentially constant below 4.2 K. The susceptibilities of single crystal $Cu(HCO2)2.4H2O$ were measured along the monoclinic axes in the same temperature intervals. The possibility of this salt becoming weakly ferromagnetic below 16.8 K is considered as is the unusual indirect exchange coupling of Cu(++) moments via formate groups. (Author)

AD-285 675 Div. 25, 15
(TISTP/TL) OTS price $2.60

Electronic Defense Labs., Mountain View, Calif.
SIGNALS, SCATTERERS, AND STATISTICS,
by Victor Twersky. 29 June 62, 18p. 8 refs.
(Engineering rept. no. EDL-E72)
(Contract DA 36-039-sc-87499)
Unclassified report

DESCRIPTORS: *Statistical functions, *Statistical distribution, *Complex numbers, *Gases, *Spheres, *Microwaves, *Scattering, Signals, Time, Analysis of variance, Vector analysis, Microwaves, Configurations, Sheets, Integral equations, Intensity, Excitation, Phase studies.

The analysis considers an ensemble of complex numbers (a set of signals in time, the field scattered by different configurations of scatterers, etc.) and obtains relations among various 'average' functions that may be defined for such an ensemble. Direct relations between the various statistical functions and the fundamental parameters of the scattering problem are established. The results facilitate inverting measured data to obtain the values of the fundamental parameters.

AD-285 780 Div. 25, 8
(TISTP/WH) OTS price $2.60

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
MAGNETOHYDRODYNAMICS AND ENERGY CONVERSION.
Technical status rept. no. 7 for period ending 31 May 62,
15 June 62, 20p. incl. illus. 3 refs.
(Contract AF 33(616)7624)
Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, *Plasma physics, *Plasma jets, *Perturbation theory, *Flames, *Electric fields, *Electromagnetic fields, Vector analysis, Special functions, Bessel functions, Differential equations.

The model used for the device consists of a jet of plasma of low conductivity at ground potential which travels along the axis of a cylindrical conductor with a voltage V with respect to the jet. Small surface perturbations are assumed in this analysis. In the experiment they are induced electrically by oscillator-amplifier combinations that are terminated in small spherical electrodes. (Author)

AD-285 791 Div. 25
(TISTP/FR) OTS price $1.10

Air Force Cambridge Research Labs., Bedford, Mass.
A RELATIVISTIC PARADOX,
by E. M. Dewan. Jul 62, 4p. incl. illus. 1 ref.
(AFCRL 62-520)
Unclassified report

DESCRIPTORS: *Relativity theory.

A length contraction paradox involving a pulsed force transverse to the motion of a rapidly moving object is discussed. Interesting distortion effects due to the ambiguity of simultaneity are examined and remarks are made concerning 'ridig' bodies in special relativity. (Author)

AD-285 795 Div. 25, 15
(TISTP/MS) OTS price $2.60

Air Force Cambridge Research Labs., Bedford, Mass.
RELATIVISTIC FORMULATION OF THE STOKES OPERATORS,
by A. Kahan. July 62, 21p. incl. illus. tables, 20 refs. (AFCRL-62-363)
Unclassified report

DESCRIPTORS: *Quantum mechanics, *Operators (Mathematics), Matrix algebra, Transformation (Mathematics), Polarization.

The classical and quantum mechanical formulation of the four Stokes parameters are reviewed. From the Dirac 4 x 4 matrix algebra, developed from the covariant relativistic formulation of quantum mechanics, an additional 12 operators are derived. The 16 operators are evaluated for the case of a free electron. (Author)

AD-285 827 Div. 25
(TISTP/FR) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MECHANICS (COLLECTION OF ARTICLES).
29 June 62, 4p. (Trans. no. FTD-TT-62-847 from Mekhanika, Sbornik Statey, Moscow, Oborongiz 92: pp. 2-4 and 119, 1959)
Unclassified report

DESCRIPTORS: *Mechanics, Scientific reports.

AD-285 837 Div. 25
(TISTP/MS) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
P. N. LEBEDEV AND THE LATEST PROBLEMS OF MODERN PHYSICS,
by F. Korolev. 18 June 62, 6p. (Trans. no. FTD-TT-62-855 from Pravda, p. 6, 14 Mar 1962)
Unclassified report

DESCRIPTORS: *Physics, *Electromagnetic theory, *Electromagnetic waves, Space flight, USSR, Light, Pressure.

AD-285 840 Div. 25
(TISTP/WH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
VIBRATIONS OF A ROTATING DISK OF CONSTANT THICKNESS WITH VANES,
by A. P. Filippov. 12 July 62, 9p. incl. tables (Trans. no. FTD-TT-62-737 from Prikladna Mekhanika 7:6, pp. 601-608, 1961)
Unclassified report

DESCRIPTORS: *Disks, *Rotating structures, *Turbine blades, *Turbine wheels, Vibration, USSR.

AD-285 844 Div. 25
(TISTE/CAM) OTS price $8.10

Israel Inst. of Tech., Haifa.
MICROWAVE STUDIES OF ADSORBED MOLECULES.
Final technical rept.,
by M. Folman. 31 July 62, 61p. illus. 42 refs.
(Contract AF 61(052)308)
(ARL 62-452) Unclassified report

DESCRIPTORS: *Molecules, *Microwaves, *Absorption, *Dielectrics, Materials, Preparation, Test equipment, Test methods, Surface properties, Relaxation time, Hysteresis, Temperature, Reflex klystrons, Feedback oscillators, Mathematical analysis, Theory, Porous glass.

Microwave absorption in 1.3 and 3.1 cm regions was studied on NH_3 and ND_3 adsorbed on a high surface area porous vycor glass adsorbent. Using a highly sensitive heterodyne-beat method in which the solid adsorbent was placed inside a resonance cavity of transmission type it was possible to measure tan delta values down to 10 1/100000 or better. The absorptions found for the two adsorbed gases were very broad and intense. From comparison of the results for NH_3 and ND_3 it was concluded that the inversion vibration in the adsorbed state does not exist. The absorptions were temperature dependent. The general shape of the bands indicated that a Debye type of absorption was present. After adopting a solution-like model for the adsorbate-adsorbent system it was possible to calculate the relaxation time for the adsorbate molecules and from its dependence on temperature the potential barrier for orientation of the dipoles was obtained. The shape of absorption curve for different surface coverages was explained in terms of surface heterogeneity of the adsorbent, and the existence of a distribution of relaxation times. Kinetic effects in absorption and hysteresis desorption were investigated and explained in terms of surface heterogeneity. Induced absorption was found in adsorbed CO_2. Possible explanations for induced absorptions in adsorbed molecules were discussed. (Author)

AD-285 845 Div. 25, 4, 9
(TISTM/EJH) OTS price $10.50

Johns Hopkins U., Baltimore, Md.
GAS-SURFACE PHENOMENA,
by Milton Rogers. Apr 62, 139p. incl. illus. tables, 14 refs.
(AFOSR-2342) Unclassified report

DESCRIPTORS: *Surfaces, *Solids, *Gases, *Adsorption, Surface properties, Lattices, Bonding, Adhesion, Friction, Metals, Atoms, Molecules, Fluid mechanics, Theory, Microscopes, Conferences.

Contents:
Historical perspective and orientation
Fluid mechanics, surface roughness
Viewing the surface
Field ion microscope
Surface lattice perfection and symmetry
Surface layers
Interaction of metal surface with environment, definition of various surface layers, chemisorbed layer, physisorbed layers, surface coverage of physisorbed layers
Gas state and flow instability
Energy considerations in gas-surface interactions
Energy relationships in chemisorption and physisorption
Accommodation coefficient
Momentum transfer, energy transfer
Relative masses and molecular structure effect on the thermal energy accommodation coefficient
Solid-solid adhesion

AD-285 851 Div. 25
(TISTP/FR) OTS price $9.10

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
A TIME SHARING SYSTEM FOR THE PDP-1 COMPUTER,
by John E. Yates. June 62, 101p. incl. illus. tables (Scientific rept. no. 5; Rept. no. ESL-R-140)
(Contract AF 19(604)6654)
(AFCRL 62-519) Unclassified report

DESCRIPTORS: *Digital computers, *Programming, Scheduling.

A system for time-sharing a PDP-1 digital computer with seven typewriters, two paper tape punches, two paper tape readers and two CRT displays is described. The additional hardware required for the system and the modifications required to a basic PDP-1 are described and a program is presented to handle the monitor or executive functions of the system. A system using two typewriters, one punch, one reader and one display based on this design is currently being installed at M.I.T. (Author)

AD-285 867 Div. 25, 8
(TISTP/WH) OTS price $3.60

RCA Defense Electronic Products, Princeton, N. J.
PLASMA ACCELERATION BY A 2.4 KMC GRADIENT ELECTRIC FIELD,
by H. W. Hendel, D. D'Agostini and others. 12 Sep 62, 15p. illus. table, 7 refs. (Rept. no. AED 1609)
(Contract AF 49(638)658)
Unclassified report

DESCRIPTORS: *Plasma jets, *Plasma physics, *Acceleration, *Extremely high frequency, *Thrust, *Superhigh frequency, Ion accelerators.

Plasma velocities up to 2,000 mi/sec for Hg ions were measured for applied rf fields less than 200 v/cm at 140 and 330 Mc and found to be in agreement with a theory developed on the basis of energy considerations. In recent work the applied frequency was raised to 2.4 kMc. Greater resolution of the velocity measurement was achieved by pulsing the accelerating rf field. The rf pulse time delay can be adjusted relative to the initiation of the plasma pulse to select a plasma volume element of critical density and thus accelerate to optimum velocity. The ion velocity was found to depend approximately linearly on the field strength. The plasma density in the 2.4 kMc experiments was higher than that of the previous experiments by a factor of about 100. The highest bulk ion

velocity measured at 700 v/cm was 800 m/sec cm/sec. The new data, obtained at applied frequencies one order of magnitude higher than those previously employed and taken over a wider field strength range, are in good agreement with the theory when the functional dependence of the collision frequency upon plasma density and rf field strength is considered. In the range of the present experiments, the increase in collision frequency with increasing applied frequency reduces the gain in thrust expected from the use of a more dense plasma at a higher applied frequency. (Author)

AD-285 877 Div. 25, 9
(TISTP/MS) OTS price $1.10

Stevens Inst. of Tech., Hoboken, N. J.
THEORETICAL RESEARCH IN THE STATISTICAL MECHANICS OF PHYSICS PROCESSES.
Final rept.
June 62, 5p. (Rept. no. SIT-P69 (6/62))
(Contract AF 49(638)352)
(AFOSR-2957) Unclassified report

DESCRIPTORS: *Fluid mechanics, *Phonons, Liquefied gases, Spectrographic analysis, Theory, Helium.

AD-285 881 Div. 25, 2
(TISTP/FR) OTS price $1.60

System Development Corp., Santa Monica, Calif.
MANIFOLD MAP BASE FORMS FOR ELECTRONIC DATA PROCESSING,
by Gerald L. Greenberg. 24 Sep 62, 13p. incl. illus. (Rept. no. SP-858)
Unclassified report

DESCRIPTORS: *Maps, Printing, Digital computers.

Manifold map forms are utilized in the printout of geographic data developed by electronic data processing systems for a predetermined geographical area. They consist of continuous sets of two-to-five-part sheets of preprinted map bases, which are fan-folded, interleaved with carbon, and designed to be processed through electronic accounting machines such as the IBM 407 or 1401. It is tabulated in alpha-numeric and special symbolic form. Several of the most essential items covered include information on design characteristics, programming, testing, and final program maintenance. Applications, production problems, and comparisons of manifold map base forms with conventional maps also are discussed. Several map illustrations and flow diagrams supplement the text. (Author)

AD-285 959 Div. 25
(TISTP/WH) OTS price $4.60

Acoustics Research Lab., Harvard U., Cambridge, Mass.
THE USE OF AMPLITUDE MODULATION FOR THE MEASUREMENT OF ULTRASONIC VELOCITY DISPERSION IN GASES,
by Wayne M. Wright. Aug 62, 42p. incl. illus. 8 refs. (Technical memo. no. 48)
(Contract Nonr-186624, Proj. NR 484-903)
Unclassified report

DESCRIPTORS: *Ultrasonics, *Ultrasonic radiation, *Velocity, *Gases, *Amplitude modulation.

Ultrasonic velocity dispersion in fluids is usually assessed by direct measurement of the speed of sound as a function of frequency. Greater accuracy might be achieved if a quantity proportional to the change of sound velocity with frequency could be measured. The mathematical theory for a dispersion-measurement method using transmission of an amplitude-modulated acoustic signal through a dispersive medium is examined for an idealized case. It is concluded that the proposed method has serious shortcomings. Two other schemes which might use properties of amplitude-modulated signals to measure acoustic velocity dispersion in gases are also considered briefly. (Author)

AD-285 963 Div. 25
(TISTP/WH) OTS price $2.60

Navy Underwater Sound Lab., Fort Trumbull, New London, Conn.
NEAR FIELD SOUND PRESSURE ON SQUARE AND RECTANGULAR PISTONS,
by David T. Porter. 12 July 62, 20p. incl. illus. tables, 14 refs. (USL rept. no. 557)
(Proj. S-F001-03-04-8044)
Unclassified report

DESCRIPTORS: *Sound, *Pressure, *Pistons, *Acoustics, Tables, Sonar.

Tables are given for determination of pressure on the surface of rectangular pistons, and on infinitely long rectangular strips. It is shown that for rectangular pistons with sides of many wavelengths, the pressure peaks on the piston are separated by about one wavelength. Graphs are presented for mutual radiation impedance between square pistons. It is shown that in computing the mutual radiation impedance between square pistons, one can usually substitute circular pistons of equivalent surface area. This substitution cannot be done with rectangular pistons, however, as the mutual radiation impedance between two rectangular pistons is affected by their orientation with respect to each other. (Author)

AD-285 973 Div. 25
(TISTP/WH) OTS price $3.60

RAND Corp., Santa Monica, Calif.
THE THERMODYNAMICS OF THE GRAPHITE-CARBON VAPOR SYSTEM,
by F. S. Krieger. Sep 62, 31p. incl. illus. tables, 3 refs. (Memo. no. RM-3326-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Graphite, *Thermodynamics, *Carbon, *High temperature research, *High pressure research, *Vapors.

Graphite over a range of temperatures up to 6000 K and pressures up to 1000 atmospheres is studied. Two sets of equilibrium composition equations were used--one representing a pure gas phase, the other a heterogeneous system of gas and solid carbon. The heterogeneous chemical system is unique in that it comprises only one chemical element. The mathematical solution of the system of equations representing the heterogeneous chemical system, therefore, required a physical constraint on the volume associated with the conditions of sublimation of graphite. The results of the computational program are presented in both tabular and graphic form. The latter is a conventional Mollier diagram in which specific enthalpy is plotted against specific entropy, with cross plots of temperature, pressure, and molecular weight. (Author)

AD-285 984 Div. 25, 17
(TISTM/TCG) OTS price $6.60

Manufacturing Labs., Inc., Cambridge, Mass.
THERMODYNAMICS OF INTERSTITIAL SOLID SOLUTIONS.

Rept. for Sep 61-Sep 62 on Refractory, Inorganic Non-Metallic Materials,
by Larry Kaufman and Harold Bernstein. Sep 62, 58p. incl. illus. tables, 26 refs.
(Contract AF 33(616)6788, Proj. 7350)
(ASD TR 61-445, pt. 2) Unclassified report

DESCRIPTORS: *Titanium, *Oxygen, *Solids, *Thermodynamics, Enthalpy, Entropy, Heat of formation, Specific heat, Vapor pressure, Phase transitions, Carbides, Nitrides, Oxides, Temperature, Solutions.

The thermodynamics of interstitial solid solutions and non-stoichiometric compounds have been applied to an analysis of the Ti-O system to evaluate explicity the contributions of positional and vibrational entropy, zero point enthalpy, and the free energy of formation of vacancies to the thermodynamic properties of hcp, bcc, and NaCl type phases in this system. Application of the results to calculations of phase equilibria, heats of formation, vapor pressure data, specific heats and vacancy concentrations over a wide range of composition and temperature compare favorably with experimental observations. X-ray measurements of the Debye temperature performed on a series of high melting carbides, nitrides, and oxides are compared with reported entropies of these compounds and predictions based on the two-Debye temperature and Lindemann approximations. (Author)

AD-286 031 Div. 25, 4
(TISTM/TCG) OTS price $1.10

Army Materials Research Agency, Watertown, Mass.
FERROMAGNETIC HALL EFFECT IN GADOLINIUM,
by A. S. Marotta and K. J. Tauer. Sep 62, 6p. incl. illus. 12 refs. (MRL rept. no. 122)
(DA Proj. 593-32-007)
Unclassified report

DESCRIPTORS: *Gadolinium, *Crystals, *Ferromagnetic materials, *Hall effect, Polymers, Atomic orbitals, Scattering, Temperature, Probability, Ferromagnetism.

The temperature dependence of the ferromagnetic Hall effect of polycrystalline gadolinium is presented and discussed. It was concluded that the net effect is probably the result of the spin-orbit interaction of the conduction electrons of d and s character together with a spin-dependent scattering probability. Several sources of a spin-dependent scattering probability are discussed. (Author)

AD-286 034 Div. 25, 9
(TISTP/WH) OTS price $9.60

Brown U., Providence, R. I.
HEAT TRANSFER ACROSS TURBULENT, IMCOMPRESSIBLE BOUNDARY LAYERS.
Interim technical rept. on Mechanics of Flight,
by J. Kestin and P. D. Richardson. July 62, 100p. incl. illus. tables, 100 refs.
(Contract AF 33(616)7749, Proj. 7063)
(ARL-169, vol. 3)
Unclassified report

Presented at the International Colloquim on Turbulence, 28 Aug-2 Sep 1961, at Marseilles, France.

DESCRIPTORS: *Turbulent boundary layers, *Heat transfer, *Convection.

The status of knowledge concerning the transfer of heat by forced convection across incompressible turbulent boundary layers is surveyed. The foundations of the semi-empirical theory are examined from first principles and the limitations of the theory are carefully noted. Elementary theories are described and an outline of D. B. Spalding's mathematically exact theory is given. The limiting cases of very high and very low Prandtl numbers are discussed. Finally, an outline of W. V. R. Malkus' theory of turbulent processes is sketched. A conscientious attempt was made to clarify all physical assumptions, to identify the major fundamental problems which require attention and to indicate directions in which the semi-empirical theory can be extended. (Author)

AD-286 039 Div. 25
(TISTP/GRW) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
DETERMINATION OF THE CRITICAL TORQUE INDUCING BUCKLING IN A TWISTED SPHERICAL SHELL SUBJECT TO INTERNAL OR EXTERNAL PRESSURE,
by C. C. Mow and M. A. Sadowsky. 1962, 11p. incl. illus.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, United States Military Academy, West Point, New York.

DESCRIPTORS: *Elastic shells, Spheres, Differential geometry, Pressure, Buckling.

The problem of determining the critical value of the torque T inducing buckling in a pressurized twisted spherical shell was solved under assumption of local non-analytic buckling. The critical relation between the values of the torque T and pressure p was explicitly determined. (Author)

AD-286 040 Div. 25
(TISTM/SJR) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
PROCESSES OF PHOTON AND EXO-ELECTRON EMISSION FROM ALKALI AZIDES,
by H. J. Mueller, H. D. Tiller, and G. D. Singer. 1962, 10p. incl. illus. 2 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, United States Military Academy, West Point, New York.

DESCRIPTORS: *Photoemission, *Excitation, *Azides, *Potassium compounds, *Sodium compounds, Alkali metal compounds, Photons, Crystals, Lattices, Stability, Electrons, Ultraviolet irradiation, Glow discharge, Luminescence.

Structural changes induced in potassium and sodium azides by irradiation and thermal decomposition were studied by observing thermoluminescence and exo-electron emission. Glow curves were taken between -196, and +400 C, which exhibited maxima both below and above room temperature. The details of the glow curves are interpreted on the basis of the present knowledge of electronic and decomposition processes occurring in these substances. (Author)

AD-286 046 Div. 25, 8
(TISTE/CAM) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
MICROWAVE DIAGNOSTICS IN THE SHOCK TUBE,

by F. L. Tevelow and H. D. Curchack. 1962, 14p. incl. illus. 19 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, United States Military Academy, West Point, New York.

DESCRIPTORS: *Microwaves, *Shock tubes, *Plasma physics, *Waveguides, *Microwave networks, Electromagnetic properties, Gas ionization, Oscilloscopes, Propagation, Electrons, Theory, Attenuation, Phase shifters, Waveguide slots, Noise (Radio).

A microwave bridge circuit is used to determine the electromagnetic properties of shock heated gas. The ionized gas passes through slots in x-band waveguide and time-resolved attenuation and phase velocity constants are determined. Electron density, collision frequency, complex dielectric constant, propagation constant, and reflection coefficient can be computed from the measurements. In another experiment, the microwave noise power emitted by the plasma is observed by displaying the amplified detected output on an oscilloscope. The radiated noise power can be related to the electron temperature. The same geometry of microwave test section in the shock tube is used in both the propagation and noise power experiments. Results of the propagation experiment are presented. Some preliminary results of the noise radiated by argon plasma and propagation data for Ms7.6 and 8.7 shocks in argon are also given. (Author)

AD-286 049 Div. 25
(TISTP/FR) OTS price $1.10

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
EFFECTS OF AIR TURBULENCE UPON PROPAGATION OF LIGHT,
by Harald W. Straub. 1962, 5p. incl. illus.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, United States Military Academy, West Point, New York.

DESCRIPTORS: *Light, *Turbulence, Propagation, Atmosphere, Photographic analysis, Motion picture photography.

Shadow patterns of turbulent air layers 1.0 and 2.2 miles thick were photographed at near-ground level. They indicate a dynamic range of 1000 to 1 of the flux density in adjacent areas of about 1 to 4 inches across. A moving picture demonstrating the phenomenon was shown. The bending-beam phenomenon is described. (Author)

AD-286 051 Div. 25
(TISTM/TCG) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
GROWTH OF HEXAGONAL FERRITE SINGLE CRYSTALS FOR APPLICATION AT MICROWAVE AND MILLIMETER-WAVE FREQUENCIES,
by Arthur Tauber and R. O. Savage, Jr. 1962, 15p. incl. illus. tables.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, United States Military Academy, West Point, New York.

DESCRIPTORS: *Single crystals, *Ferrites, *Microwave frequency, Barium compounds, Preparation, Communication systems, Microwave spectroscopy, Ferromagnetic materials, Magnetic properties, Growth.

The ever increasing traffic of the communications medium combined with an urgent need for secure transmission of messages has directed attention to broadcasting at higher frequencies. The lower range of the microwave spectrum has been intensively exploited during the last twenty years. Attention is now focused at the upper microwave and millimeter wave spectrum, 10 to 70 kilomegocycles/sec. Before devices and systems can be designed components must be found that can operate at these higher frequencies. The synthesis of a series of single crystal hexagonal ferrites potentially useful in several different devices at microwave and millimeter wave frequencies is described. Some of the unique intrinsic properties which make these crystals applicable at these frequencies were measured and are reported. Several devices were constructed and operated with these crystals. The experimental results and potentialities of such devices are described. (Author)

AD-286 053 Div. 25
(TISTP/WH) OTS price $1.60

Army Research Office, Offfice of the Chief, Research and Development, Washington, D. C.
THE SIGNIFICANCE OF SPECTROSCOPICALLY DETERMINED PLASMA JET TEMPERATURES,
by T. G. Roberts. 1962, 15p. incl. illus. 40 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962 at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Plasma jets, *Plasma physics, *Temperature, *Spectrographic analysis.

The concepts of temperature utilized in plasma physics are explained in a semi-qualitative manner. The laws which govern the emitted radiation from optically thick and from optically thin plasmas are utilized. Examples of the measurements of three of these temperatures are included. (Author)

AD-286 062 Div. 25
(TISTW/PCR) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
LASER PROGRESS AND APPLICATIONS,
by Harrison J. Merrill. 1962, 13p. incl. illus. table, 7 refs.
Unclassified report

Presented at the 1962 Army Science Conference, 20-22 June 1962 at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Lasers, Theory, Ruby, Chromium, Range finding, Illumination, Communication systems, Guidance, Welding, Retina, Surgery.

The intensive laser development is based on a consideration of Schwalow and Townes who determined that optical stimulation could occur when the difference in energy states exceeded a certain minimum value. The output develops through emission as the population of a higher energy state is stimulated to return to the ground level. The condition of oscillation is controlled by reflectivity of cavity ends, the temperature and the effective volume. The modification of the Q by changes in reflectivity during laser stimulation permits operation in a single pulse having a peak power more than

3 megawatts with half power time less than 50 nano-sec. The pink ruby doped with .05% chromium has proved most useful operated as the three level laser. Improved efficiency and quality may be achieved by use of other materials. The laser source is unique optically characterized by its coherence, monochromaticity and high energy density. It may be useful in range finding, special illumination and communication and guidance control; as a source for special scientific investigations; it has already found uses in micro-welding and for restoring detached retinas in the eye.

AD-286 075 Div. 25
(TISTP/WH) OTS price $12.50

Florida U. Engineering and Industrial Experiment Station, Gainesville.
STUDY OF THE PROPAGATION AND DISSIPATION OF ''ELASTIC'' WAVE ENERGY IN GRANULAR SOILS,
by F. E. Richart, Jr., J. R. Hall, Jr., and J. Lysmer. Sep 62, 172p. incl. illus. tables, 76 refs.
(Contract DA 22-079-eng-314)
Unclassified report

DESCRIPTORS: *Soils, *Sand, *Wave transmission, *Propagation, Oscillation, Elasticity, Damping.

Laboratory tests were conducted on selected granular materials to determine the velocities of propagation of the shear and compression waves and to evaluate the internal damping. Test variables included the confining pressure, amplitude of vibration, void ratio of the material, saturation, and grain size. Resonant column tests were used for wave velocity evaluation, and the vibration decay method and static torsion tests were used to determine damping. The granular materials used were Ottawa standard sand, two sizes of glass spheres, and a crushed quartz. Confining pressure had the most significant effect on velocities of wave propagation, with velocities increasing about with the 1/4 power of the confining pressure. Damping determined from the decay of steady state vibrations behaved like viscous damping. The values of logarithmic decrement varied from about 0.02 to 0.20 for these materials and test conditions. Higher values of logarithmic decrement were found in the static torsion tests because stresses up to 75 per cent of the failure conditions were used. (Author)

AD-286 084 Div. 25
(TISTP/WH) OTS price $1.10

Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park.
ON A RESULT OF HADAMARD CONCERNING THE SIGN OF THE PRECESSION OF A HEAVY SYMMETRICAL TOP,
by J. B. Diaz and F. T. Metcalf. Apr 62, 3p. 3 refs. (Technical note no. BN-285)
(Contract AF 49(638)228) Unclassified report

DESCRIPTORS: *Gyroscopes, *Motion, *Harmonic analysis, *Integrals, *Complex variables.

AD-286 092 Div. 25, 8
(TISTP/MS) OTS price $4.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
COMPLEX GUIDED WAVES: PART II. RELATION TO RADIATION PATTERNS,
by T. Tamir and A. A. Oliner. 30 Apr 62, 26p. illus. 9 refs. (Research rept. no. PIBMRI-1009-62)
(Contract AF 19(604)7499)
(AFCRL 62-523) Unclassified report

DESCRIPTORS: *Waveguides, *Microwaves, *Wave analysis, *Antenna radiation patterns, Equations, Configuration.

The presence of complex waves in the near field of a source-excited plane homogeneous interface is shown to play an important role in determining certain features of the radiation field. A Kirchhoff-Huygens integration over the near field reveals that whenever these complex waves are strongly excited, they account for peaks in the radiation pattern. In the case of undirectional excitation, each complex wave yields a single peak at some oblique angle; for bidirectional excitation, either two peaks appear symmetrically located with respect to a normal to the interface or a single peak is present in this normal (broadside) direction. It is also shown that when the complex wave is slowly decaying at the interface, the peaks occur close to the angle of definition theta sub c for that wave. These angles of maximum radiation and the associated gain functions are expressed, for all of these cases, in terms of the location in the steepest-descent plane of the pole corresponding to the complex wave. These features are also shown to be consistent with the radiation mechanism discussed in the companion paper, Part I. (Author)

AD-286 109 Div. 25
(TISTP/WH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A GYROSCOPIC LINEAR ACCELEROMETER,
by M. Z. Litvin-Sedoy. 31 May 62, 14p. incl. illus. 10 refs. (Trans. no. FTD-TT-62-486 from Izvestiya Akademii Nauk SSSR. Otdeleniye Tekhnicheskikh Nauk. Mekhanika i Mashinostroyeniye, No. 2, pp. 55-60, 1961)
Unclassified report

DESCRIPTORS: *Gyroscopes, *Accelerometers, *Motion, *Errors, USSR.

AD-286 114 Div. 25, 15
(TISTP/WH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command Wright-Patterson Air Force Base, Ohio.
MODELLING OF LINEAR OPTIMAL HIGH-SPEED OPERATIONS BY USING RELAY CIRCUITS,
by V. G. Boltyanskiy. 31 May 62, 9p. incl. illus. 5 refs. (Trans. no. FTD-TT-62-485 from Doklady Akademii Nauk SSSR, 139:2, pp. 275-278, 1961)
Unclassified report

DESCRIPTORS: *Ballistics, *Operators (Mathematics), *Vector analysis, *Analog computers, *Relays, *Electrical relays, USSR.

AD-286 117 Div. 25
(TISTP/TL) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE PRESENT AND FUTURE OF ACCELERATOR TECHNOLOGY,
by M. S. Rabinovich. 8 June 62, 22p. incl. illus. (Trans. no. FTD-TT-62-385 from Nauka i Zhizn', No. 5, pp. 17-23, 1960)
Unclassified report

DESCRIPTORS: *Particle accelerators, Design, Magnets, Magnetic fields, Focusing, Stability.

AD-286 120 Div. 25
(TISTP/TL) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE EFFECT OF VARIABLE HEAT FLOW ALONG THE SUR-

FACE OF A PIPE ON HEAT TRANSFER WITH TURBULENT FLOW,
by G. S. Ambrok. 4 June 62, 9p. incl. table, 5 refs. (Trans. no. FTD-TT-62-380 from Inzhenerno-Fizicheskiy Zhurnal, 4:7, pp. 19-24, 1961)
Unclassified report

DESCRIPTORS: *Heat transfer, *Pipes, *Turbulent flow, Thermal stresses, Deformation, Velocity, Laminar boundary layer, Friction, Algebra, Functional analysis.

AD-286 130 Div. 25
(TISTM/ODN) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INVESTIGATION OF THE INFLUENCE OF THE PHYSICAL PROPERTIES OF A LIQUID ON CRITICAL HEAT FLUXES UNDER BOILING,
by V. G. Morozov. 19 July 62, 15p. incl. illus. 16 refs. (Trans. no. FTD-TT-62-674 from Energetika, Izvestiya Vysshikh Uchebnykh Zavedeniy, No. 1, pp. 73-81, 1961)
Unclassified report

DESCRIPTORS: *Liquids, *Boiling, *Physical properties, Vapor pressure, Heat, Alcohols, Methanols, Ethanols, Propanols, Carbon tetrachloride, Pressure, Carbon, Metal plates, Wire, USSR.

Numerous tests on various liquids established that maximum critical heat fluxes were equal for all practical purposes in the case of boiling on horizontal plates 3 to 10 inches in height and on plates with their surfaces directed upward. Curves q(cr) = f (p) for methanol, propanol, and all other liquids are maximum at a pressure equal to 1/3 p(cr). The critical load increases (in comparison with the q(cr) for atmospheric pressure) by a factor of 2.3 to 2.8. The experimental data obtained are in good agreement with the generalized criterial equations proposed in the work of Sterman. Values of q(cr) obtained on plates covered with C are 12 to 15% greater than those obtained on clean surfaces. Sterman, L. S., Zh. Tekh, Fiziki, Vol. 23, No. 2 (1953). (Author)

AD-286 136 Div. 25
(TISTP/WH) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE TORSION OF ANISOTROPIC PRISMATIC RODS HAVING A CROSS SECTION THE FORM OF AN ELONGATED AERONAUTICAL PROFILE,
by V. S. Sarkisyan. 31 May 62, 32p. incl. tables, 22 refs. (Trans. no. FTD-TT-62-384 from Izvestiya Akademii Nauk Armyanskoy SSR-Seriya Fiziko-Matematicheskikh Nauk, 14:2, pp. 45-70, 1961)
Unclassified report

DESCRIPTORS: *Rods, *Aerodynamic configurations, *Torque, *Stresses, *Elasticity, Partial differential equations, USSR.

The problem of the torsion of nonorthotropic rods having cross sections in the form of the general type of elongated aerodynamic profile is examined. Using the method of the smallest parameter, expressions of the functions of stress, rigidity, and tangential stress are obtained and the maximum stresses are determined. The problems of the accuracy of the approximate formulas for torsional rigidity are investigated and the obtained results are illustrated by numerical examples. As the particular case, results are obtained for the torsion of anisotropic rods having cross sections in the form of an elongated parabolic crescent, a parabolic segment, and a semi-cubical parabola. (Author)

AD-286 138 Div. 25
(TISTP/FR) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A STUDY OF THE LOCAL HEAT TRANSFER OF A GAS-TURBINE PROFILE,
by G. S. Ambrok. 7 June 62, 10p. incl. illus. table, 4 refs. (Trans. no. FTD-TT-62-454 from Energomashinostroyeniye, No. 2, pp. 29-31, 1960)
Unclassified report

DESCRIPTORS: *Turbine blades, Gas turbines, Heat transfer.

An experimental study was made of the heat transfer of a gas-turbine blade in a flat profile lattice with the maximum M number at the output of the lattice being M = 0.72. (Author)

AD-286 140 Div. 25
(TISTP/WH) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
HEAT POWER ENGINEERING (SELECTED ARTICLES).
19 July 62, 29p. incl. illus. 8 refs. (Trans. no. FTD-TT-62-665 from Teploenergetika, No. 12, pp. 45-51, 55-59, 1961)
Unclassified report

DESCRIPTORS: *Heat engines, *Gas turbines, Design, USSR.

Contents:
A turbine stage having guide channels with flat walls
The design of a stage with conical restricting surfaces

AD-286 156 Div. 25
(TISTP/FR) OTS price $7.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
SMALL ANGLE X-RAY SCATTERING: AN ANNOTATED BIBLIOGRAPHY,
comp. by Jack B. Goldmann. June 62, 67p. (Special research bibliography no. SRB-62-4; Rept. no. 6-90-62-35)
Unclassified report

DESCRIPTORS: *X rays, Scattering, Particles, Surface properties, Bibliography.

A survey of literature pertaining to small angle and low angle x-ray scattering emphasizing studies of particle size and determination of surface areas is given which supplements and extends the one included in Guinier, A. and Fournet, G. 'Small-Angle Scattering of X-Rays (New York, Wiley, 1955)' to the year 1962. Citations are arranged alphabetically by author. (Author)

AD-286 162 Div. 25
(TISTM/SJR) OTS price $5.60

Uppsala U., Sweden.
THE STRUCTURE OF FERMION DENSITY MATRICES,
by A. J. Coleman. 1 June 62, 57p. 10 refs. (Technical note no. 80)
(Contract AF 61(052)351)
(ARL 62-440) Unclassified report

DESCRIPTORS: *Quantum mechanics, *Matrix calculus, *Nucleons, Matrix algebra.

A new approach is presented to the many-particle problem in quantum mechanics by proposing a method of finding natural orbitals and natural geminals of a system without prior knowledge of the wave function. It expounds hitherto unpublished results of the author's work. (Author)

AD-286 166 Div. 25
(TISTP/MS) OTS price $3.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
AN INVESTIGATION OF THE EQUILIBRIUM PRESSURE ALONG UNEQUALLY HEATED TUBES (ADDENDUM), by G. D. Arney, Jr. and A. B. Bailey. Oct 62, 31p. incl. illus. tables, 6 refs. (Rept. no. AEDC TDR 62-188; Addendum to AEDC TDR 62-26, AD-272 077)
(Contract AF 40(600)1000, Proj. 8953)
Unclassified report

DESCRIPTORS: *Pressure vessels, *Low pressure research, Temperature, Thermodynamics, Vacuum systems, Measurement.

Results are presented of an investigation of the error introduced in very low pressure measurements when small tubes with axial temperature gradients connect pressure transducer and the point where knowledge of the pressure is desired. The experiments reported in AEDC-TDR-62-26 were extended with air, argon, and helium to include higher Knudsen numbers and to include data taken with the pressure transducer at the hot end of the tube. Although the form of the pressure-temperature relationship was specified with good accuracy to a Knudsen number of 5.0, the degree of scatter for larger Knudsen numbers was such (±5%) that it was not possible to fix accurately the free molecule limit. Also in the present analysis, what is considered to be a more accepted definition of mean free path is used, and the opportunity was taken to recalculate the earlier work using this definition. (Author)

AD-286 177 Div. 25, 8
(TISTM/EJH) OTS price $3.60

Sylvania Electric Products, Inc., Waltham, Mass.
ACTIVE THIN-FILM TECHNIQUES MICROMIN PROGRAM. Interim development rept., 22 June-22 Sep 62. 12 Oct 62, 32p. incl. illus. tables, 5 refs.
(Contract NObsr-87633)
Unclassified report

DESCRIPTORS: *Diodes, *Transistors, *Thin films, *Semiconducting films, Manufacturing methods, Vapor plating, Metallic smoke deposits, Single crystals, Growth, Vacuum apparatus, Electron guns, Crystals, Aluminum compounds, Oxides, Ceramic coatings, Glass, Thermal expansion, Viscosity, Impurities, Resistance.

A process for depositing device-quality silicon films on polycrystalline insulating substrates by vacuum evaporation of the silicon and to form diodes and transistors on these films was investigated. Previous work with hydrogen reduction of silicon tetrachloride led to the deposition of such films and devices on fluid glassy layers coating the polycrystalline substrates. The high (10 to the -9th power Torr) vacuum evaporation equipment including electron beam gun and power supply were designed and ordered. Further development of glaze material produced a coating which permitted the deposition of properly doped silicon films, both n- and p-type, using the reduction process for deposition. (Author)

AD-286 182 Div. 25
(TISTP/WH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ENGINEERING PHYSICS JOURNAL (SELECTED ARTICLES) 23 July 62, 14p. incl. illus. refs. (Trans. no. FTD-TT-62-679 from Inzhenerno-Fizicheskiy Zhurnal 4:8, pp. 30-35, 111-113, 1961)
Unclassified report

DESCRIPTORS: *Convection, *Heat transfer, *Gases, *Thermal conductivity, *Heat exchangers, *Atomization, USSR.

A method is described for intensifying convection heat transfer from a gas to the heating surface by introducing into the gaseous mixture an atomized intermediate liquid heat-transfer agent. The results of preliminary experimental studies of the aerodynamics and heat transfer of a two-phase gas-liquid heat-transfer agent are presented. (Author)

AD-286 186 Div. 25
(TISTP/TL) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE BASIC PATTERNS OF HEAT TRANSFER IN A RAREFIED GAS IN THE CASE OF NATURAL CONVECTION, by A. N. Devoyno. 25 June 62, 14p. incl. illus. 11 refs. (Trans. no. FTD-TT-62-677 from Inzhenerno-Fizicheskiy Zhurnal, No. 6, pp. 70-77, 1961)
Unclassified report

DESCRIPTORS: *Heat transfer, *Sheets, *Superaerodynamics, Fluid flow, Convection, Mach number, Reynolds number, Differential equations, Friction.

The problem of the heat transfer between a vertical plate and a rarefied gas in viscous and molecular-viscous regimes is presented. The theoretical solution to the problem is compared with the experimental results of the author. (Author)

AD-286 190 Div. 25
(TISTP/FR) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INVESTIGATING THE LUMINESCENCE ORIGINATING DURING THE ELECTRIC FULMINATION OF THIN WIRES, by M. P. Vanyukov and V. I. Isayenko. 13 June 62, 9p. (Trans. no. FTD-TT-62-777 from Zhurnal Tekhnicheskoy Fiziki 32:2, pp. 197-201, 1962)
Unclassified report

DESCRIPTORS: *Wire, *Detonation, Luminescence.

With the aid of an electron-optical scanner the development of luminescence and cloud of fulmination products originating during the fulmination of wires was investigated. Established were certain laws governing the rate of expansion of the luminous channel and cloud of fulmination products, as well as the localization of the zone of luminescence. (Author)

AD-286 216 Div. 25
(TISTM/TCG) OTS price $1.60

Watkins-Johnson Co., Palo Alto, Calif.
RESEARCH AND INVESTIGATION OF MATERIALS FOR LASER APPLICATIONS.

Interim engineering rept. no. 1, 1 July-30 Sep 62,
by R. Fitzpatrick and S. E. Sobottka. 30 Sep 62, 10p. incl. illus. 8 refs. (Rept. no. W-J 62-612R4)
(Contract AF 33(657)8917)
Unclassified report

DESCRIPTORS: *Crystals, *Gallium compounds, *Arsenides, *Sulfides, *Lasers, Growth, Chemical impurities, Additives, Neodymium, Europium, Rare earth compounds, Thermal diffusion, Powder metals, Sintering, Chemical analysis, Neutron spectroscopy, Thermionic emission, Radioactivity, Optical analysis, Electrical properties, Preparation.

Research is being conducted to prepare and optimize semiconductor materials for electron injection laser applications. Our approach is based primarily on investigation of III-V and II-VI compounds with rare earth activators. The major problem of this program is to find a material with maximum quantum efficiency, low resistivity, and good optical qualities, with radiative properties associated with a good laser material. The immediate effort utilizes well established experimental techniques to determine the necessary parameters such as recombination mechanisms, quantum efficiencies, transition probabilities, etc. The experiments will include the following measurements: free carrier densities; optical absorption, excitation, and fluorescence spectra; thermal and optical quenching of photo conductivity and luminescence. Various host crystals and activators will be studied while varying the parameters to maximize quantum efficiency. (Author)

AD-286 250 Div. 25, 22
(TISTW/JRG) OTS price $1.10

Aerojet-General Corp., Downey, Calif.
PULSE-SENSITIVE ELECTROEXPLOSIVE DEVICES.
Monthly progress rept. no. 3 for Sep 62,
by H. M. Kenworthy. 15 Oct 62, 4p. incl. illus. 1 ref. (Rept. no. 0689-01(03)MP)
(Contract N178-8107)
Unclassified report

DESCRIPTORS: *Metal films, *Electric bridges, Thin films, Platinum, Gold, Iron, Nickel, Aluminum, Glass, Beryllium compounds, Ceramic materials, Resistance, Heat, Oxides, Temperature sensitive elements, Infrared radiation, Wire, Measurement, Electric detonator, Design, Heat transfer, Temperature.

Work continues on an investigation of the behavior of electrically pulsed metal films on substrates of high thermal conductivity. The purpose is to investigate the behavior of a film when it is electrically heated and is in physical contact with a heat sink. Specifically, the object is to study the variable parameters and to develop a manufacturing process or processes for applying a bridge heating element to a ceramic surface with the required thermal contact. (Author)

AD-286 278 Div. 25
(TISTP/FR) OTS price $6.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
INVESTIGATION OF NON-THERMAL IONIZATION FOR MHD ENERGY CONVERSION.
Quarterly rept. no. 2, 15 June-15 Sep 62.
60p. incl. illus. tables, 14 refs.
(Contract AF 33(657)8298, Proj. 8173)
Unclassified report

DESCRIPTORS: *Ionization, *Gas discharges, *Discharge tubes, Cesium, Potassium, Vapors, Helium, Electrons, Ions, Magnetohydrodynamics.

Results of two groups of experiments performed in cold cathode cesium diodes are given. The first group of experiments covered cesium-helium discharge phenomena in a diode configuration and were made to verify theoretical non-equilibrium concepts and formulations. The second group of experiments covered pure cesium discharges in a similar geometry and were conducted to answer questions concerning plasma conductivity, uniformity of discharge, and gradients produced in the positive column and the effect of wall conduction on the discharge. In the first case, it was possible to verify experimentally the theoretical work by showing that non-equilibrium phenomena did exist in select cesium-helium mixtures at current densities of 1-10 amperes per sq cm and that the experimental data closely matched the theoretical curve which represented values opaque to resonance radiation. For the pure cesium case, the experimental data checked within a factor of two for fully ionized condition. Loss of cesium to the walls of the container prevented accumulation of data above 1/(3 x 10 to the 16th)cu cm. At a cesium density of 1/(3 x 10 to the 16th)cu cm it is shown that electrons having energies of the order of 0.18 ev must exist compared to gas temperature to be consistent with experimental data. (Author)

AD-286 290 Div. 25, 15
(TISTP/WH) OTS price $2.60

Harvard U. Div. of Engineering and Applied Physics, Cambridge, Mass.
ON THE 'BEST' FIRST-ORDER LINEAR SHELL THEORY,
by Bernard Budiansky and J. Lyell Sanders, Jr.
Sep 62, 19p. 7 refs. (Technical rept. no. 14)
(Contract Nonr-186602)
Unclassified report

DESCRIPTORS: *Elastic shells, *Deformation, *Stresses, *Tensor analysis.

The general linear theory of thin elastic shells is treated. A set of equations that uniquely embody certain clearly desirable characteristics is derived. (Author)

AD-286 296 Div. 25
(TISTP/WH) OTS price $3.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
A SYSTEMATIC ANALYSIS FOR SHELLS OF REVOLUTION WITH NONSYMMETRIC LOADS.
Technical report on Mathematics,
by C. R. Steele. June 62, 27p. 7 refs. (Rept. no. 6-90-61-58)
Unclassified report

DESCRIPTORS: *Elastic shells, *Bodies of revolution, *Loading, *Stresses, *Membranes, Deformation.

It is known that the general solution for a steep shell of revolution with loads of sufficiently slow circumferential variation is adequately approximated by a linear combination of the membrane, inextensional, and edge effect solutions. However, a systematic technique for evaluating the arbitrary constants for each harmonic of loading from the boundary conditions has been lacking. The solutions, including the particular solutions for surface loads and temperature effects, the deformations for the membrane solutions, and the curvature changes for the inextensional deformation, are presented in what may be their simplest form for the shell

of arbitrary meridian. The relative order of magnitude of the contribution of each solution to the various stresses and displacements is tabulated. This tabulation makes apparent the relative magnitudes of the arbitrary constants required to satisfy a particular set of boundary conditions. (Author)

AD-286 313 Div. 25
(TISTP/WH) OTS price $1.10

Aerospace Information Div., Washington, D. C.
OAR (RRY) SPECIAL TRANSLATION,
by S. M. Karal'nyk and S. B. Nyzhnyk. 1962, 7p. incl. table, 10 refs. (Trans. from On the Origin of X-Ray Satellites. Ukrayins'kyy fizychnyy zhurnal 2:4, pp. 333-337, 1957)
Unclassified report

DESCRIPTORS: *Electron transistors, *X-ray spectroscopy, *Atomic spectrum, *Quantum mechanics, USSR.

AD-286 315 Div. 25
(TISTM/ODN) OTS price $1.10

Aerospace Information Div., Washington, D. C.
OAR (RRY) SPECIAL TRANSLATION,
by Yu. D. Kondrashev, I. P. Tverdovskiy and Zh. L. Vert. 1962, 7p. incl. illus. table. (Trans. from An X-Ray Study of Dispersed Ni-Pd Precipitates Obtained by Electrolysis. IN: Akademiya Nauk SSSR. Doklady 78:4, pp. 729-731, 1951).
Unclassified report

DESCRIPTORS: *Nickel alloys, *Palladium alloys, *X-ray photography, *Alloys, X-rays, Single crystals (Metallurgy), Crystals, Nickel, Chlorides, Potassium compounds, Lattices, Chemical analysis, USSR, Electrolysis, Crystal structure.

Ni-Pd alloys, obtained in dispersed form by electrolytic coprecipitation, were studied. Unit cell dimensions, true crystal structure, i.e., the dispersion (dimensions of single crystals), and the lattice distortion were determined. For the determination of these 3 values, the method of standards was used. The advantage inherent in this method is that it makes it possible to evaluate the effect of several experimental factors which otherwise could not readily be determined. Furthermore, the method requires only one x-ray photograph for each sample studied. KCl and Ni were used as standards for the Ni- and Pd- rich regions of the system. The substances used as standards were ground and calcined in H2 at 400 C. The mixture of the standard substance with the sample was charged into a celluloid capillary and analyzed under rotation by means of Cu-irradiation in a standard powder metallurgical chamber (r = 28.7 mm). The roentgenograms were photometrically evaluated on a Zeiss microphotometer. (Author)

AD-286 334 Div. 25
(TISTP/WH) OTS price $3.60

J. G. Engineering Research Associates, Baltimore, Md.
RANDOM LOADING AND RADIATION FROM STIFFENED AND SANDWICH TYPE CYLINDRICAL SHELL STRUCTURES. PART I. BASIC EQUATIONS AND SOME PRELIMINARY RESULTS, by Joshua E. Greenspon. Sep 62, 30p. incl. illus. refs. (Technical rept. no. 7)
(Contract Nonr-273300, Proj. 385-412)
Unclassified report

DESCRIPTORS: *Sandwich construction, *Structural shells, *Loading, *Vibration, *Ship hulls, Cylindrical bodies.

The vibration and radiation characteristics of sandwich-type cylindrical shell structures are investigated. In practical situations the cylindrical structure is subjected to many types of exciting forces. Most of these forces are not describable in any straight forward fashion and some are even random in nature. However, some of the exciting forces can usually be described statistically by correlation functions and power spectra. The purpose of this study is to give a unified presentation of the free and forced vibrations of stiffened and sandwich type cylindrical shells vibrating in water under general types of discrete and random forces. (Author)

AD-286 350 Div. 25
(TISTE/CAM) OTS price $1.10

Aerospace Information Div., Washington, D. C.
SPECIAL TRANSLATION,
by M. D. Galanin, A. M. Leontovich, and Z. A. Chizhikova. Oct 62, 4p. incl. illus. 2 refs. (Trans. from Coherence and Beam Directivity of an Optical Ruby Oscillator. Zhurnal eksperimental'noy i teoreticheskoy fiziki 4:1, pp. 347-349, 1962)
Unclassified report

DESCRIPTORS: *Lasers, *Crystal oscillators, Crystal structure, Ruby, Diffraction, Lenses, Focusing, Optical images, Translations.

The relationship between coherence and beam directivity of a ruby laser was studied. It was shown that radiation pulses during emission occur simultaneously over the entire radiating area of the crystal. It was shown that emission pulses always occur simultaneously in various regions of the crystal, though at times there may be a difference in the relative peak size. (Author)

AD-286 359 Div. 25
(TISTP/MS) OTS price $12.50

Electrical Engineering Research Lab., U. of Illinois, Urbana.
PRODUCTION OF ACOUSTIC WAVES AS A RESULT OF RF BREAKDOWN OF GASES AN EXPERIMENTAL STUDY, by M. Roux. Aug 62, 170p. incl. illus. table, 25 refs. (Technical rept. no. 3)
(Contract DA 36-039-sc-78313)
Unclassified report

DESCRIPTORS: *Plasma physics, *Microwaves, Gases, Acoustics, Plasma oscillations, Electrons, Ions, Theory, Mathematical analysis, Propagation.

The delayed propagation of longitudinal waves in the afterglow of a weakly ionized plasma created by a 1 mu s, high power, RF pulse at a frequency of 3000 Mc was investigated. The results show that the waves are excited during the breakdown of the gas and exhibit two different geometries. These waves can be located in space and time, by means of a photomultiplier or a separate microwave system, from the perturbation they introduce in the light radiated by the plasma or in the density of the electrons. The results show that only the type of the gas and the temperature of the electrons have a decisive influence on the propagation velocity of these waves. By using a mixture of gases, in which the nature of the ions can be changed as a result of charge transfer, or by selectively heating the electron gas, the propagation velocity of the detected waves could be altered or controlled. In the mixture experiment, the results are in quantitative agreement and in the heating experiment in qualitative agreement with the theoretically predicted propagation velocity of a pseudo-sound wave. From these 2

types of experiments, which independently act on a different parameter controlling the wave velocity, it appears reasonable to conclude that the wave detected is a pseudo-sound wave. (Author)

AD-286 366 Div. 25, 8
(TISTP/WH) OTS price $9.60

Jet Propulsion Center, Purdue U., Lafayette, Ind.
SUMMARY OF PUBLISHED LITERATURE CONCERNED WITH ELECTRIC ARC PHENOMENA PERTINENT TO PLASMA JET DEVICES,
by J. G. Skifstad. Aug 62, 107p. incl. illus. table (Rept. no. TM-62-4; JPC 319)
(Contract Nonr-110017)
Unclassified report

DESCRIPTORS: *Electric arcs, *Plasma jets, *Bibliography.

Information on electric arcs that may be related to the application of arcs in plasma jet devices is summarized. The following types of literature are considered: (a) the literature concerned with unconfined d.c. arcs, and (b) the literature concerned with confined arcs of various types. A comparison of the reported values of important variables, such as the temperature, the current density and the column field for both types of arcs is included in order to stress those aspects of confined arcs considered most significant in plasma jet devices. No attempt was made to include the many theoretical aspects of arcs and thermal plasmas. Those topics will be considered in the analytical portion of the research investigation. (Author)

AD-286 374 Div. 25
(TISTP/WH) OTS price $6.60

Ionosphere Research Lab., Pennsylvania State U., University Park.
EXPERIMENTAL DETERMINATION OF THE CROSS SECTIONS FOR DISSOCIATIVE ATTACHMENT OF ELECTRONS IN MOLECULAR IODINE AND PHOTO-DETACHMENT OF ELECTRONS FROM NEGATIVE IONS OF ATOMIC IODINE,
by William M. Keeffe. 1 Nov 62, 66p. incl. illus. refs. (Scientific rept. no. 172)
(Contract AF 19(604)4563, Proj. 8605 and Grant G 10889)
(AFCRL 62-1007) Unclassified report

DESCRIPTORS: *Gas discharges, *Microwaves, *Dissociation, *Recombination reactions, *Gas ionization, *Photon bombardment, *Probability, *Electrons, Plasma physics, Iodine.

Electron decay rates in the afterglow of a microwave discharge in iodine vapor are studied. Electron attachment is shown to be the dominant electron loss process, and the measured attachment cross section is found to be Sa = 1.9 x 10 to the -16th power sq cm is not sufficient to produce a measurable amount of photodetachment, which permits an upper limit of Sd < 4 x 10 to the -17th power sq cm to be established for the photodetachment cross section. (Author)

AD-286 378 Div. 25
(TISTM/EJH) OTS price $5.60

Rensselaer Polytechnic Inst., Troy, N. Y.
STRESS PROPAGATION IN NON-LINEAR VISCOELASTIC MATERIALS: UNLOADING CYCLE,
by Edward J. Mercado. 14 Sep 62, 39p. incl. illus. 9 refs. (Technical rept. no. 4)
(Contract DA 30-115-509-ORD-1009)
Unclassified report

DESCRIPTORS: *Stresses, *Solids, Metals, Loading, Elasticity, Viscosity, Deformation, Wave transmission, Shock waves, Propagation, Theory, Mathematical analysis, Differential equations, Integral equations, Programming.

Stress propagation in a nonlinear viscoelastic material is analyzed for the unloading portion of a complete stress-strain cycle. The loading process is the subject of a previous report. The elastic unloading theory developed by Malvern is reviewed and extended to include stress-strain laws with nonlinear unloading. Numerical techniques for solution are outlined for both infinitesimal and finite strain theories. (Author)

AD-286 385 Div. 25
(TISTM/EJH) OTS price $2.60

New York State Coll. of Ceramics, Alfred U.
STEADY STATE AND TRANSIENT THEORY OF THERMOELECTRIC COOLING JUNCTIONS.
Technical rept. on Semiconducting Materials,
by T. J. Gray. Sep 62, 23p. incl. illus. table, 6 refs.
(Contract Nonr-150301, Proj. NR 015-215)
Unclassified report

DESCRIPTORS: *Thermoelectricity, *Cooling, *Semiconductors, Theory, Mathematical analysis, Integral transforms, Solid state physics.

The theory of Peltier cooling with semiconductors has, up to this date, been dealt with in a limited manner. Equations expressing the stationary and transient behavior of Peltier cooling junctions have been used to determine the theoretical behavior of thermoelements subject to direct current as well as to pulses of varying shape, length, and frequency. These equations have established results which, although agreeing in some respects, are not always consistent with experimental evidence. It seems that where disagreements do arise, the reason is that not all conditions intervening in Peltier cooling have been considered in these equations, conditions which are considered too important to be neglected. The exact solution of an equation which takes more factors into account and which expresses the stationary and transient behavior of Peltier cooling junctions is presented. (Author)

AD-286 400 Div. 25
(TISTP/LMH) OTS price $1.10

Western Australia U., Perth.
A STUDY OF THE ENERGY SPECTRA OF LOW ENERGY ELECTRONS SCATTERED BY SOLIDS.
Annual technical rept., 1 June 61-31 May 62,
by J. B. Swan. 31 May 62, 5p. 4 refs.
(Grant DA-ARO-61-3)
Unclassified report

DESCRIPTORS: *Electrons, *Mass energy relation, Solids, Spectrographic analysis, Mass spectrometers, Scattering.

AD-286 404 Div. 25, 8
(TISTP/WH) OTS price $8.10

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
A STUDY OF AN INDUCTION-COUPLED PLASMA OPERATING AT 400 KILOCYCLES.
Master's thesis,
by Howard R. Cannon. Aug 62, 71p. incl. illus. tables, 3 refs. (Rept. no. GA/Phys/62-2)
Unclassified report

DESCRIPTORS: *Induction heating, *Plasma physics, Radiofrequency, Instrumentation, Theses.

A rf, electrodeless plasma-generator was developed which operated at peak plasma powers of 50 kw. The plasma was vortex stabilized, and was contained within a water-cooled Vycor tube. Power was measured calorimetrically. Radiation power was measured by alternately using clear water and water made opaque with India ink to cool the Vycor tube. A model temperature profile was deduced from spectrographic measurements transverse to the plasma axis. Maximum plasma temperatures were shown to exist in a thin cylindrical sheath near the plasma surface, with relatively cooler temperatures existing at the center-line gas back-flow. Effects of changing gas flowrate, gas composition, rf power, and Vycor tube diameter on the effectiveness of the energy coupling mechanism are shown. (Author)

AD-286 410 Div. 25
(TISTM/TCG) OTS price $1.10

Cornell U., Ithaca, N. Y.
(No title).
Final interim rept.,
by B. Widom. 2 July 62, 2p.
(Contracts AF 18(603)111 and AF 49(638)1047)
(AFOSR-2939) Unclassified report

DESCRIPTORS: *Molecular structure, *Molecular rotation, *Inelastic scattering, Perturbation theory, Relaxation time, Differential equations, Dynamics, Mathematical analysis.

AD-286 427 Div. 25
(TISTP/TL) OTS price $2.60

Virginia U., Charlottesville.
ON THE STABILITY OF THE STRUCTURE OF CRYSTAL SURFACES,
by N. Cabrera. 1962, 16p. incl. illus. 5 refs.
(Contract Nonr-4740(5))
Unclassified report

DESCRIPTORS: *Crystals, *Crystal structure, Surface, Stability, Thermodynamics, Surface tension, Stresses, Tensor analysis, Functions, Partial differential equations, Phase studies.

A crystal surface arbitrarily oriented is not necessarily stable. For some orientations, the crystal surface breaks up into a structure containing several new orientations, which might be called surface phases. A thermodynamical treatment is presented, to determine the conditions under which this happens, which follows exactly the same lines as the theory of equilibrium of volume phases. It shows that the equilibrium surface structure for a given average orientation will contain one, two or three orientations (surface phases) depending on the number of points a tangent plane touches the surface beta, representing the surface tension, per unit area of a reference surface, as a function of orientation. (Author)

AD-286 428 Div. 25
(TISTP/TL) OTS price $10.10

Westinghouse Electric Corp., Pittsburgh, Pa.
SOLIDIFICATION,
by W. A. Tiller. 1 June 62, 122p. incl. illus. 22 refs. (Scientific paper no. 62-925-116-P6)
(Contract AF 49(638)1029)
Unclassified report

DESCRIPTORS: *Solids, *Solid state physics, *Crystals, Nucleation, Lattices, Crystal structure, Growth, Silicon, Germanium, Temperature, Thermal stresses, Molecules, Nuclei.

AD-286 436 Div. 25, 4
(TISTM/TCG) OTS price $2.60

TYCO Labs., Inc., Waltham, Mass.
THE TRAVELLING SOLVENT METHOD OF CRYSTAL GROWTH.
Quarterly rept. no. 5, 15 May-15 Aug 62,
by M. Weinstein, S. D. Axelrod, and A. I. Mlavsky. 14 Sep 62, 9p. illus.
(Contract AF 19(604)8803)
(AFCRL 62-752) Unclassified report

DESCRIPTORS: *Crystals, *Gallium compounds, *Arsenides, Gallium, Chemical impurities, Solvent action, Test methods, Zone melting, Silicon compounds, Carbides, Chromium, Silicon, Vapor plating, Wetting agents, Polymers, Growth.

In an effort to achieve a better understanding of the mechanism of the Travelling Solvent Method and its use for producing p-n junctions, the system Ga-GaAs was investigated further. Work was carried out in the following areas: (1) Ga-GaAs System (p-n junction formation by solvent doping; electrical characterization of p-n junctions; and study of zone movement as a function of zone thickness and of A-face/B-face orientation) and (2) SiC (the Cr-SiC system to improve wetting and zone passing; and initial studies of the Si-SiC system using vapor-deposited Si). (Author)

AD-286 442 Div. 25
(TISTP/TL) OTS price $1.60

Massachusetts Inst. of Tech., Cambridge.
MAGNETIC STUDIES OF IRRADIATED HEMATITE CRYSTALS.
Annual summary rept.,
by Robert E. Ogilvie. 15 Sep 62, 14p. incl. illus. 7 refs.
(Contract Nonr-184184, Proj. NR 031-686)
Unclassified report

DESCRIPTORS: *Ferromagnetism, *Single crystals (Metallurgy), *Iron, *Ores, X rays, Measurement, Lattices, Magnetic fields.

The role of radiation-induced defects on the ferromagnetic component in hematite was investigated. X-ray studies including Kossel line patterns are being carried out in conjunction with the magnetic measurements. (Author)

AD-286 447 Div. 25
(TISTA/GEC) OTS price $10.50

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
COMPUTER CONTROLLED ADAPTIVE FEEDBACK CONTROL SYSTEMS.
Final rept.,
by Joseph Bongiorno. 6 Sep 62, 128p. incl. illus. (Rept. no. PIBMRI-1039-62)
(Contract DA 30-069-ORD-2646)
(AROD rept. no. 2268.11)
Unclassified report

DESCRIPTORS: *Control systems, Feedback, Computers, Design, Analysis, Stability, Decision making, Functions, Electronic circuits, Theory, Automatic pilots, Servo systems, Differential equations, Analog computer, Automatic.

A unified and basic theory for adaptive systems was developed. The analytical tools applicable in the analyses and design of adaptive control systems were computed. The specific adaptive control systems presented are in themselves of limited interest; it is the underlying adaptive philosophy and analytical techniques employed in analyzing the specific systems which are of importance. (Author)

AD-286 455 Div. 25
(TISTP/WH) OTS price $9.60

Naval Ordnance Lab., White Oak, Md.
LIGHT SCATTERING BY PARTIALLY ABSORBING CYLINDERS. COEFFICIENTS,
by Louis F. Libelo. 15 Aug 62, 113p. (Rept. no. NOLTR 62-142)
Unclassified report

DESCRIPTORS: *Scattering, *Electromagnetic waves, *Refractive index, *Light, *Absorption, Cylindrical bodies, Theory, Tables.

A table of the complex scattering coefficients is presented for the problem of scattering of normally incident, linearly polarized, plane electromagnetic waves by partially absorbing infinite circular cylinders. The numerical results were obtained by means of the IBM 7090 computer system at the U. S. Naval Ordnance Laboratory. This table contains the scattering coefficients for the incident plane wave polarized parallel to the cylinder axis and also those for the incident plane wave polarized perpendicular to the cylinder axis. (Author)

AD-286 456 Div. 25, 17
(TISTM/ODN) OTS price $2.25

RCA Labs. Div., Radio Corp. of America, Princeton, N. J.
SUPERCONDUCTIVITY IN METALS AND ALLOYS.
Rept. for 15 May 59-1 Dec 61, on Applied Research in Electrical, Electronic and Magnetic Materials, by W. H. Cherry, G. D. Cody and others. Aug 62, 86p. incl. illus. tables, 61 refs.
(Contract AF 33(616)6405, Proj. 7371)
(ASD TDR 62-269) Unclassified report

DESCRIPTORS: *Superconductivity, *Metals, *Alloys, *Superconductors, Low temperature research, Foils, Metal films, Tin, Liquefied gases, Helium, Lead, Indium, Sapphires, Lanthanum, Hydrogen, Metallic crystals, Deuterium, Synthesis, Intermetallic compounds, Niobium alloys, Tantalum alloys, Vanadium alloys, Tin alloys, Transition temperature, Resistance, Phase studies.

Methods were developed for the measurement of the interphase energy in superconductors. A description of the method is given along with preliminary results on thin foils and films of tin. Measurements were made of the thermal contact resistance (Kapitza resistance) between various solids and liquid He in the normal and superconducting states for Pb, Sn and In, and for the insulator sapphire. Qualitative agreement is found between the results and current theories of the Kapitza resistance. Measurements of the effect of H and D on the superconducting transition temperature of La revealed that they both depress the transition temperature, H more than D. Measurements were made of the transition temperatures in the system (Nb, Ta, V)3Sn. The transition temperatures range from 2.8 to 18 K and can be related to a simple mass and volume dependence. Critical field measurements indicate behavior similar to that in other ''hard'' superconductors. Resistance measurements revealed a resistance anomaly near 100 K which can be related to existing theories.. A new method of preparation of Nb3Sn was developed. (Author)

AD-286 458 Div. 25
(TISTM/ODN) OTS price $1.10

Army Materials Research Agency, Watertown, Mass.
IMAGE OF THE FERMI SURFACE IN LEAD,
by A. Paskin and R. J. Weiss. Sep 62, 4p. incl. illus. 3 refs. (MRL rept. no. 124)
(DA Proj. 593-32-007)
Unclassified report

DESCRIPTORS: *Lead, *Surface properties, *Physics, X-rays, Surfaces, Oxides, Crystals, Scattering, Vibration, Phonons.

A search was made for the Kohn anomalies in Pb by measuring the thermal diffuse scattering of X-rays. Anomalies were found in accord with the neutron measurements of Brockhouse and coworkers (Brockhouse, B.N., Rao, K. R., and Woods, A.D.B., Phys. Re. Letters 3:93 (1961)). The anomalies are somewhat different from the free electron values. The anomalies only seem to be associated with longitudinal modes of vibration. The measurements were hindered by spurious diffraction peaks arising from an oxide surface or regions of polycrystallinity.

AD-286 461 Div. 25
(TISTM/ODN) OTS price $10.50

Amersil Quartz Div., Engelhard Industries, Inc., Hillside, N. J.
FUSED QUARTZ INVESTIGATION.
Final technical rept.,
by E. C. Mutschler. Mar 62, 131p. incl. illus. tables, 13 refs.
(Contract AF 30(602)1745; proj. no. 4506)
(RADC-TDR 62-174) Unclassified report

DESCRIPTORS: *Quartz, *Delay lines, *Melting, Frequency, Elasticity, Vibration, Disks, Theory, Optics, Ultrasonics, Test methods, Tests, Manufacturing methods, Resonance.

A plan of investigation is outlined by which testing methods could be developed for predicting the suitability of fused quartz blanks for high-performance, folded delay lines. A theoretical basis is derived for the use of the resonant frequency of free, flexural vibration to determine the elastic constants of fused quartz discs. The flexural vibration setup is described and the results are tabulated. Several ultrasonic and optical testing methods are also described. Results of these tests on 38 sample delay line blanks are also given. Plans for proving out the testing methods are outlined. These include the fabrication of delay lines from the samples and correlation of measured delay line parameters with the results from the various testing methods. (Author)

AD-286 485 Div. 25
(TISTP/TL) OTS price $12.00

General American Transportation Corp., Niles, Ill.
THEORETICAL STUDY OF ENERGY DISTRIBUTION IN A HALF-SPACE UNDER DYNAMIC LOADS.
Final rept.,
by J. B. Harkin. July 62, 153p. incl. illus. tables, 30 refs.
(Contract AF 29(601)2832, Proj. 1080)
(AFSWC TDR 62-43) Unclassified report

DESCRIPTORS: *Seismic waves, *Nuclear explosions, *Mathematical prediction, *Earth, *Motion, *Underground structures, *Loading, Stresses, Shear stresses, Shock waves, Air, Blast, Numerical analysis, Polynomials, Programming, Computers, Fourier analysis, Series, Theory, Partial differential equations.

An analytical procedure is developed for predicting free-field ground motions and stresses

for use in the design of underground protective structures. Analytic expressions in integral form are obtained for the solutions to the problems of an elastic half-space and a viscoelastic half-space, each under an axisymmetric time-dependent normal loading possessing the essential features of a nuclear burst. A computer code for the evaluation of these expressions is developed through the use of Fourier-Legendre series and other special analytical techniques. Graphs are presented for one case of the elastic problem. (Author)

AD-286 489 Div. 25
(TISTP/TL) OTS price $11.00

Illinois U., Urbana.
A STUDY OF TWO APPROXIMATE METHODS OF ANALYZING CYLINDRICAL SHELL ROOFS,
by K. P. Chuang and A. S. Veletsos. Oct 62, 138p. incl. illus. tables, 19 refs. (Structural research series no. 258)
(Contract Nonr-1834(03), Proj. NR 064-183)
Unclassified report

DESCRIPTORS: *Cylindrical shells, *Elasticity, *Deformation, *Numerical analysis, *Differential equations, Trigonometry, Stresses, Moments, Loading, Differential equations.

The application of the Ritz energy procedure and of the method of finite differences to the analysis of cylindrical shell roofs that are simply supported along the curved edges is presented. The condition of support along the longitudinal or straight edges is considered to be arbitrary. The shell is assumed to be of uniform thickness, and the material of the shell is assumed to be elastic. There appears to be no critical study made of the application of these methods to the analysis of shell problems. Brief comments on a few known references on this topic are made. The principal objectives of this study were: (a) To provide information which would facilitate the application of these methods in the solution of specific problems, and (b) With the aid of numerical solutions, to study the degree of accuracy that can be achieved by each of these methods when a relatively small number of approximating functions or mesh points is used. (Author)

AD-286 497 Div. 25
(TISTP/FR) OTS price $8.10

Temple U., Philadelphia, Pa.
RESEARCH DIRECTED TOWARD THE ATTAINMENT AND UTILIZATION OF HIGH TEMPERATURES.
Final rept.,
by J. L. Bohn, F. H. Nadig and others. 31 May 62, 79p. incl. illus. tables, 5 refs.
(Contract AF 19(604)3076, Proj. 8608)
(AFCRL 62-455) Unclassified report

DESCRIPTORS: *Wire, Detonation, Photographic analysis, Rotating-mirror cameras.

A study of the velocity of expansion of exploding wires was undertaken and partially completed. The wire being studied was placed in series with the capacitor bank consisting of one Aerovox capacitor of 14.6 microfarad. The capacitor bank was discharged by means of a lovotron switch triggered by a rotating mirror camera. The frames of each picture were correlated with the current waveforms so that the exact time from the initiation of the discharge to the first frame could be determined. The relationship of picture size to actual subject size was determined by taking a picture of an object of known dimensions and obtaining the proportionality factor from it. (Author)

AD-286 523 Div. 25, 30
(TISTM/EJH) OTS price $6.60

Linde Co., Tanawanda, N. Y.
THE CRYOSORPTION PUMPING OF HYDROGEN AND HELIUM AT 20 K.
Interim rept.,
by S. A. Stern, J. T. Mullhaupt and others.
Oct 62, 60p. incl. illus. tables, 9 refs.
(Contract AF 40(600)944)
(AEDC TDR 62-200) Unclassified report

DESCRIPTORS: *Cryogenics, *Helium, *Hydrogen, Space environmental conditions, Simulation, Vacuum pumps, Vacuum systems, Vacuum apparatus, Low pressure research, Low temperature research, Materials, Adsorption, Charcoal, Surfaces.

The feasibility of pumping hydrogen and helium gas by adsorption at temperatures near 20 K was investigated. The objective was to determine the potential application of this technique to large space simulation chambers. The adsorptive capacity of 8 selected adsorbents for H and He was determined under equilibrium conditions at temperatures between 20 and 40 K and at pressures from 3 x 10 to the -8th power to 1 x 10 to the -3rd power torr. Cryosorption pumping under constant H gas leak was demonstrated for the three adsorbents studied: Molecular Sieves 13X and Pd-loaded Ammonium Y, and coconut charcoal. The cryosorption of H gas on the adsorbents refrigerated with liquid H was examined. Measurements of pumping speed showed that the adsorbents pumped at least 99.9% of the gas admitted to the cryosorption pump. Only the adsorbent surface directly exposed to the gas flow was effective. The capacity and efficiency of this effective surface were strongly dependent on its temperature. (Author)

AD-286 525 Div. 25, 26
(TISTM/TCG) OTS price $1.60

Army Signal Research and Development Lab., Fort Monmouth, N. J.
THE BEILBY LAYER,
by Walter J. Warden. July 62, 12p. incl. illus. table, 10 refs. (ASRDL technical rept. no. 2285)
Unclassified report

DESCRIPTORS: *Quartz crystals, *Solids, *Electrolytic polishing, *Theory, Plastic flow, Surface properties, Surfaces, Hardness, Processing.

Consideration is given to experiments supporting the Beilby Layer Theory, i.e., an amorphous superficial structure can occur on the surface of a material as a result of a plastic flow developed by a polishing operation. This investigation is intended to illustrate the theory and stimulate interest in it because of its importance to the design, fabrication, and application of low-friction metallic items, glass lenses and prisms, semiconductors, and quartz frequency-control crystals. (Author)

AD-286 540 Div. 25
(TISTP/JW) OTS price $5.60

Texas Instruments, Inc., Dallas.
SOLID-STATE TECHNIQUES FOR MODULATION AND DEMODULATION OF OPTICAL WAVES.
Quarterly progress rept. no. 1, 1 May-31 July 62,
by Dayton D. Eden. 31 July 62, 55p. incl. illus.
(Contract DA 36-039-sc-89221, Proj. 3A-99-21-001)
Unclassified report

DESCRIPTORS: *Optics, *Solid state physics, Modulation, Optical analysis, Wave characteristics, Lasers, Resonance.

Description of work performed during the report period includes: X-band light modulator constructed and operated successfully as a pulsed modulator; broad-bandwidth coaxial cavity-type modulator constructed and operated as continuous modulator from dc to 400 mcps; good voice and TV transmitted via mercury-arc light; gallium arsenide light-emitting diodes modulated to 500 mcps; and good audio and TV transmitted over IR from these diodes. Work on the demodulator this period included diffusion studies; selection of the pillbox; development of masking and etching techniques for small-area detectors and of specialized diffusion techniques; and measurement of relative spectral sensitivity of germanium photodiodes. (Author)

AD-286 541 Div. 25, 4
(TISTM/ODN) OTS price $12.00

Tufts U., Medford, Mass.
STUDIES IN MOLECULAR SPECTRA AND STRUCTURES.
Doctoral thesis,
by Kee Hyun Rhee. 1 July 62, 140p. incl. illus. tables, 47 refs. (Scientific rept. no. 1; Rept. no. P8603, T860303)
(Contract AF 19(604)8033)
(AFCRL 62-855) Unclassified report

DESCRIPTORS: *Germanium compounds, *Hydrogen compounds, *Halides, *Infrared spectroscopy, Chlorides, Bromides, Iodides, Fluorides, Deuterated compounds, Vibration, Microwaves, Gases, Solids, Methyl radicals, Silicon compounds, Hydrides, Frequency, Theory, Bibliography, Low temperature research, Raman spectroscopy, Molecular structure.

IR spectra of the germyl halides, GeH3F, GeH3Cl, GeH3Br, GeH3I, and their fully deuterated analogues were investigated. Assignments of all of the fundamental frequencies and some of the overtone and combination bands were given. The cause of the appreciable frequency change of the symmetrical Ge-H bending vibration on going from the F through the Cl and Br to the I were examined. The vibrational Raman and IR spectra of digermane and digermane-d6 were measured. The rotational fine structure of 2 of the 3 Eu fundamentals was resolved and their zeta values approximated. (Author)

AD-286 543 Div. 25
(TISTP/MS) OTS price $7.60

Washington Square Coll., New York U., N. Y.
RESEARCH ON SOLID STATE RADIATION-INDUCED PHENOMENA.
Quarterly progress rept. no. 10, May-July 62,
by Hartmut P. Kallmann. Sep 62, 67p. incl. illus. tables.
(Contract DA 36-039-sc-85126)
Unclassified report

DESCRIPTORS: *Solid state physics, *Semiconductors, *Conductivity, *X rays, *Liquefied gases, Luminescence, Benzenes, High temperature research, Impurities, Cadmium compounds, Sulfides, Single crystals, Zinc, Brillouin zones, Nitrogen, Fluorescence, Photoconductivity.

Luminescent and photoconductivity measurements (the latter using a.c. impedance methods) were performed on a ZnS:Cu and ZnS:Ag phosphor under X-Ray excitation. These measurements were made during the rise, equilibrium, decay, and glow periods as well as under various conditions of infrared irradiation. These results clearly show that the usually accepted phosphor model (Schon-Klassens) must be appreciably modified. Two series of ZnS/Cu:Cl phosphor powders are prepared; one series with the careful exclusion of O2, the second with O2 added to atmosphere during firing. All other preparative conditions are identical. Luminescence spectra, luminescent glow curves, I.R. effects and electroluminescence of each phosphor are investigated.

AD-286 565 Div. 25, 9
(TISTP/WH) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AN EXPERIMENTAL INVESTIGATION OF EVAPORATIVE COOLING OF THE SURFACE OF A POROUS CONE WITH A HIGH-TEMPERATURE GAS FLOW PASSING AROUND IT,
by V. M. Polyayev. 17 Aug 62, 20p. incl. illus.
(Trans. no. FTD-TT-62-1032 from Izvestiya vysshikh uchebnykh zavedeniy. Mashinostroyeniye 7: pp. 149-160, 1960)
Unclassified report

DESCRIPTORS: *Conical bodies, *Cooling, *Gas flow, *Evaporation, Porosity, USSR.

The film regime of evaporative cooling of the surfaces of porous cones with different vertex angles and with high temperature gas flows passing around them is considered. The results of the experiments are generalized on the basis of the theory of similarity. Criterional equations are obtained for the film regime of evaporative cooling of porous cones with different vertex angles. (Author)

AD-286 577 Div. 25
(TISTP/FR) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INVESTIGATION OF R-F MOTORS,
by B. N. Gorozhankin. 19 Sep 62, 12p. 9 refs.
(Trans. no. FTD-TT-62-1126 from Issledovaniya Po Fizike I Radiotekhnike, Trudy Instituta 8: pp. 3-13, 1962)
Unclassified report

DESCRIPTORS: *Electric motors, Radiofrequency, Crystals, Torque, Light, Polarization, Liquids, Radio waves.

Problems concerning direct conversion of energy of high frequency electromagnetic oscillations into mechanical energy are discussed. Results obtained from theoretical and experimental investigations of rf asynchronous and synchronous motors are listed.

AD-286 583 Div. 25, 4
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MEASURING THE DIFFUSION OF NITROGEN IN LIQUID OXYGEN,
by M. M. Bagrov. 10 Sep 62, 6p. incl. illus. 3 refs. (Trans. no. FTD-TT-62-802 from Ukrayins'kyy Fizychnyy Zhurnal 6:4, pp. 486-488, 1961)
Unclassified report

DESCRIPTORS: *Gases, *Nitrogen, *Liquefied gases, *Oxygen, *Diffusion, Test methods, Low-temperature research, USSR, Physical properties.

The gasphase method, applied for studying the

diffusion phenomenon in liquid gases, was used for measuring the diffusion coefficient of N in O at a temperature of 67.8 K. The measuring method and experimental installation are described. (Author)

AD-286 597 Div. 25
(TISTP/TL) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PLASTIC FLOW DURING SIMULTANEOUS CONTINUOUS STRETCHING AND TORSION WHERE THE TORSIONAL MOMENTS ARE LIGHT,
by B. M. Malyshev. 28 Aug 62, 19p. incl. illus. tables, 2 refs. (Trans. no. FTD-TT-62-605 from Vestnik Moskovskogo Universiteta, Seriya Matematiki, Mekhaniki, Astronomii, Fiziki, i Khimii, No. 1, pp. 55-68, 1958)
Unclassified report

DESCRIPTORS: *Plastic flow, Stresses, Deformation, Moments, Loading, Tensor analysis.

AD-286 599 Div. 25
(TISTM/SJR) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A MEDIUM WITH A NEGATIVE ABSORPTION FACTOR,
by F. A. Butayeva and V. A. Fabrikant. 11 Sep 62, 15p. incl. table, 8 refs. (Trans. no. FTD-TT-62-1114 from Akademiya Nauk SSSR, Fizicheskiy Institut Imeni P. N. Lebedev, Issledovaniya po Eksparimentalnoy i Teoreticheskoy Fiziki, Sbornik, Moskva, pp. 62-70, 1959)
Unclassified report

DESCRIPTORS: *Photoemission, *Absorption, Electron transitions, Fluorescence, USSR, Atomic structure, Excitation, Microwaves, Life expectancy, Dipole moments, Cesium, Mercury, Hydrogen, Thermodynamics.

Russian work on negative absorption (induced emission) is presented. Experimental difficulties in determining negative absorption, mathematical analysis of the concepts involved, creation of a molecular generator of microwave radiation, and implications for construction of ''masers'' are discussed. Experimental data for emission spectra of cesium and mercury in an atmosphere of helium or hydrogen are given.

AD-286 600 Div. 25
(TISTP/WH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
EQUATIONS OF PLANE DEFORMATION IN LINEAR HARDENING HAVING TIME DIFFERENTIAL OPERATORS,
by M. I. Rozovskiy. 21 Aug 62, 15p. incl. illus. 12 refs. (Trans. no. FTD-TT-62-1039 from Izvestiya Akademii Nauk SSSR, OTN Mekhanika i Mashinostroyeniye, No. 5, pp. 80-87, 1960)
Unclassified report

DESCRIPTORS: *Elasticity, *Plasticity, *Stresses, *Creep, *Relaxation time, *Deformation, *Metals, USSR.

Integral-operator equations of creep and relaxation corresponding to A. Yu. Ishlinskiy's generalized model of plane elastoplastic deformation with linear hardening of a compressible material are set up and analyzed. Using these equations, the peculiarities of relaxation in the elasticity and plasticity zones with hardening are studied. A study is made of the nature of the change with respect to time of the radius of a plasticity zone (with linear hardening) located near a circular aperture cut in an infinite plane about the circumference of which a pressure is exerted. (Author)

AD-286 601 Div. 25
(TISTP/TL) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INVESTIGATION OF HEAT-TRANSFER IN THE CASE OF A CYLINDER IN A STREAM OF EXPANDED GAS,
by M. N. Izakov and S. P. Perov. 11 Sep 62, 21p. incl. illus. table (Trans. no. FTD-TT-62-1091 from Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Mekanika i Mashinostroyeniye, No. 1, pp. 42-51, 1962)
Unclassified report

DESCRIPTORS: *Heat transfer, *Cylindrical bodies, *Gas flow, Aerodynamic heating, Molecules, Nozzles, Boundary layer, Reynolds number.

The study of heat transfer in the case of bodies flushed by an expanded gas is studied. The recovery factors and heat transfer coefficients for a cylinder (positioned across a stream) over a wide range of Reynolds numbers were measured in order to bring out the laws governing the changes in these quantities in all flow regions ranging from free-molecule to continuum (the flow of a continuous medium). In this case, greatest attention was devoted to the investigation of the recovery factor because of its particular significance for problems of thermometry as well as the Nusselt-number function. It was for this reason that tungsten wires of various diameters were subjected to testing in a wind tunnel of variable density; the region under investigation encompassed the following Mach-, Reynolds-, and Knudsen-number ranges. (Author)

AD-286 602 Div. 25
(TISTM/ODN) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INSTRUMENT FOR DETECTING CARBON DIOXIDE IN ATMOSPHERIC AIR,
by S. V. Lyutsarev. 5 Sep 62, 7p. incl. illus. 4 refs. (Trans. no. FTD-TT-62-1190 from Akademiya Nauk SSSR, Trudy, Instituta Okeanologii, Vol. 47, pp. 199-200, 1961)
Unclassified report

DESCRIPTORS: *Instrumentation, *Carbon compounds, *Dioxides, *Detection, *Air, USSR, Titration, Gases, Solutions, Absorption, Analysis.

A chemical gas-analyzer with a titrometric ending permits the multiple passage of the same gas sample through an absorbtion solution and attains the most complete absorbtion of 100% of the gas under investigation. Reproducibility of the separate experiments at a concentration of CO2 in the gas of approximately 0.03% consists of 2% relative. The gas-analyzer permits the detection of CO2 in a small volume of gas (50 cm). Sea pitching does not effect the operation of the device. (Author)

AD-286 610 Div. 25
(TISTP/WH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
GRAVITATIONAL-WAVE RADIATION,

by I. I. Gutman. 28 Aug 62, 4p. 3 refs. (Trans. no. FTD-TT-621156 from Izvestiya Akademii Nauk USSR, Seriya Fiziko-Matematicheskikh Nauk, No. 5, pp. 90-91, 1961)
Unclassified report

DESCRIPTORS: *Gravity, *Relativity theory, USSR.

An invariant expression is derived for a stream of gravitational energy, for which a general covariant generalization of the integral law of energy conservation is made and a covariant expression for the Poynting vector is introduced. (Author)

AD-286 622 Div. 25
(TISTP/WH) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
RAYS TO THE COSMOS (Luch Idet v Kosmos).
by V. A. Fabrikant. 10 Sep 62, 36p. incl. illus. (Trans. no. FTD-TT-62-867 from Izdatel'stvo ''Znaniye'' Moskva, 1961)
Unclassified report

DESCRIPTORS: *Relativity theory, *Atomic orbitals, *Electron transitions, *Electromagnetic waves, *Atomic energy levels, *Lasers, USSR.

Contents:
The Strange Fate of a Certain Discovery of A. Einstein
What Occurs in the Interior of a Heated Body
The Principle of Minute Equilibrium and the Use of an Elevator in an Apartment House
The Juggler's Art and Negative Temperature
The Volleying of Light Beams and a New Means of Generating Light
An Energy Band for Chromium Ions and the Light Generator
''Kind' Helium Atoms and ''Greedy'' Neon Atoms
Harmonious Labor of Radiating Atoms in a Light Generator
On the Earth and in the Cosmos

AD-286 633 Div. 25
(TISTP/MS) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
APPLIED MATHEMATICS AND MECHANICS (SELECTED ARTICLES).
18 Sep 62, 30p. incl. illus. 11 refs. (Trans. no. FTD-TT-62-1116 from Prikladnaya Matematika i Mekhanika 26:2, pp. 247-258, 365-369, 1962)
Unclassified report

DESCRIPTORS: *Tracking, *Gyroscopes, *Gimbals, Motion, Design, Matrix algebra, Mathematical analysis.

AD-286 634 Div. 25
(TISTP/MS) OTS price $21.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CONVECTION AND RADIATION HEAT TRANSFER (Konvektiviyy i Luchistyy Teploobmen).
11 Sep 62, 368p. incl. illus. tables, refs. (Trans. no. FTD-TT-61-395 from Izdatel'stvo Akademii Nauk SSSR, Moskva, 1960)
Unclassified report

DESCRIPTORS: *Convection, *Heat transfer, Measurement, Test equipment.

AD-286 638 Div. 25
(TISTP/FR) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D.C.
THE INTERACTION OF ELECTROMAGNETIC RADIATION AND SEMICONDUCTORS.
by H. Jacobs, F. A. Brand and others. 1962, 15p. incl. illus. tables, 7 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, N. Y.

DESCRIPTORS: *Semiconductors, *Microwaves, Transmission, Reflection, Dielectric properties, Resistance, Physical properties.

The equations for the interaction of electromagnetic radiation and semiconductors were formulated using the transmission line analogue. Effects such as predicted in the Drude-Zener theory for inertial effects in the infrared or low temperature region can be included. Experiments were conducted to measure fundamental properties of semiconductors by microwave techniques. In addition, a new family of devices was developed such as amplitude and phase modulators suitable for operation from the low microwave region to well into the infrared. (Author)

AD-286 643 Div. 25
(TISTM/ODN) OTS price $1.10

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
DETERMINATION OF THE GEOMETRY OF HIDDEN DEFECTS BY ULTRASONIC PULSE ANALYSIS TESTING.
by O. R. Gericke. 1962, 9p. incl. illus.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Ultrasonics, *Ultrasonic spectrum analysis, *Metals, *Pulse analyzers, Solids, Frequency, Tests.

Current methods for ultrasonic inspection of metals and other solid materials are limited by their inability to determine the geometry of concealed defects if these defects are comparable in size, or smaller than the width of the ultrasonic search beam. Whenever such relatively small flaws are involved, ultrasonic pulse echo testing, if conducted at a single frequency, will yield the flaw location only but no information on the flaw geometry. Hence, it is very difficult to interpret the test results. The difficulty can be overcome by introducing the novel ultrasonic test method described in this paper. In this method, ultrasonic signals are utilized which contain a broad band of frequencies, and in analogy to optics, can therefore be considered as white ultrasonic pulses. The form and spectral energy distribution, or color, of such ultrasonic pulses is influenced by the geometry of a defect from which they are reflected. Hence, an analysis of the defect echo yields information on the defect configuration. The successful application of the ultrasonic pulse analysis method for differentiating between flaws of various configurations is illustrated by a number of test examples. (Author)

AD-286 645 Div. 25, 4
(TISTM/TCG) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
EXOTHERMIC REACTIONS BEHIND REFLECTED SHOCKS,

by Arthur Cohen, Robert A. Wires, and Roger A. Strehlow. 1962, 10p. incl. illus. 7 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Hydrogen, *Oxygen, *Diboranes, *Argon, *Shock waves, *Chemical reactions, Gases, Shock tubes, High temperature research, Energy, Reaction kinetics, Combustion, Ignition.

A new shock tube technique is described by which high temperature studies of exothermic reactions can be made. The formation of reaction waves at the back wall of a shock tube are recorded using a schlieren technique and a rotating drum camera. Data are obtained by measuring times to wave formation. The results of investigations of reaction in stoichiometric H-O-Ar and diborane-Ar mixtures initiated by the reflected shock are presented. (Author)

AD-286 655 Div. 25
(TISTP/MS) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
GENERATION AND CONTROL OF AN OUTDOOR ELECTROMAGNETIC ENVIRONMENT THROUGH AUTOMATIC MEANS.
by George D. Brosious. 1962, 14p. incl. illus. 2 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Electromagnetism, *Control systems, Test facilities, Automatic.

Although many methods of realistic environment generation were considered, the method selected is based on the use of actual Army electronics equipment, slightly modified to enable automatic control. The location and number of the environment generators is determined by the application of certain reduction factors to a realistic tactical scenario. This paper presents the philosophy of environment generation, in conjunction with an explanation of the methods used to achieve its implementation. The control system required to perform valid, automatic testing in this facility is described in detail. The overall control system is subdivided as follows: (1) an automatic control system which provides control of the environment generators as well as recording test results, and (2) a frequency monitoring system which ensures proper frequency usage and valid test data. (Author)

AD-286 659 Div. 25, 4
(TISTM/TCG) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
THE ROLE OF ELECTRON CONFIGURATION ON PROPERTIES IN DILUTE SOLID SOLUTION ALLOYS.
by E. P. Abrahamson and J. A. Alexander. 1962, 10p. incl. illus. 15 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Solids, *Solutions, *Alloys, Electron transitions, Impurities, Crystallization, Solvent action, Grains (Metallurgy), Phase transitions, Diffusion, Thermal expansion, Lattices, Atomic orbitals, Theory, Physical properties, Atomic structure.

Data are summarized relating to the effect of dilute impurities upon the recrystallization characteristics of pure metallic elements. Correlations are presented relating the electronic structure of the solute and solvent to the changes in recrystallization temperature resultant upon alloying. The implications of these observations with regard to current theories of grain boundary inhibition are discussed. Evidence is presented for a model more dependent upon changes in bulk characteristics, the solute interaction with surrounding solvent atoms being of prime importance. The relation of these interactions to electronic structure is discussed. (Author)

AD-286 661 Div. 25
(TISTP/MS) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
OPTIMUM LINEAR FILTERING FOR LINE SCAN IMAGING SYSTEMS,
by Leslie G. Gallahan, Jr. 1962, 14p. incl. illus. 22 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Optics, *Optical systems, *Least squares method, Theory, Electronic scanners.

A new model for the analysis of a class of line scan imaging systems which permits the quantitative comparison of the performance of one- and two-dimensional linear filtering operations is developed. In this model the electro-optical components involved in the actual recording of a continuous two-dimensional spatial signal are characterized as a single pre-filter. The scanning process is characterized as a one-dimensional sampling of the continuous two-dimensional signal at the output of the pre-filter. Thus, the actual recorded data consists of sets of parallel lines which are available for either one or two-dimensional processing in a post-filter. Using this conceptual model, the analytical problems reduces to determining the optimum one or two-dimensional post-filters in terms of known input signal and pre-filter descriptions. (Author)

AD-286 667 Div. 25
(TISTM/SJR) OTS price $1.60

Western Reserve U., Cleveland, Ohio.
POSITRON ANNIHILATION REACTIONS IN CONDENSED MATERIALS.
Final rept., 1 July 60-30 June 62,
by John D. McGervey. 30 June 62, 5p. illus.
(Contract AF 49(638)760)
Unclassified report

DESCRIPTORS: *Positrons, *Annihilation reactions, *Atomic structure, Aluminum, Copper, Tin, Titanium, Zinc, Alloys, Brass, Pulse analyzers, Counting methods, Radioactive isotopes, Sodium, Metals.

Measurements were made of the time distribution of positron annihilations in aluminum, tin, copper, titanium, and zinc. All of the metals measured to date have shown a long lived component. This component, which is still unexplained, contains from 5 to 10% of the total counts, with

a mean life of about 4 x 10 to the -10th power sec in all the metals measured. The presence of the long lived component is deduced from an extremely small number of counts. Nevertheless these counts are significantly above the background level; the counting rate in the peak was about 5000 times the background. Short mean lives in these metals were determined by subtracting the counts in the extrapolated long lived component and measuring the slope of the remaining distribution. Data are being obtained on the angular distribution of annihilation radiation from alloys. The angular correlation method gives a direct experimental determination of the Fermi energy of the conduction electrons. The major difficulty with the method is that in many alloys of interest a large number of positrons annihilate with core electrons rather than conduction electrons, and it is necessary to subtract this component in order to obtain the curve for conduction electron annihilation. (Author)

AD-286 668 Div. 25
(TISTP/FR) OTS price $3.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
THIN-FILM BOLOMETER,
by Herbert S. Glick. July 62, 29p. illus.
(Rept. no. CAL-119)
Unclassified report

DESCRIPTORS: *Resistance thermometers, Thin films, Platinum, Metal films, Glass, Antennas, Electromagnetic waves.

The thermal characteristics of the thin-film resistance thermometer for measurement of electromagnetic energy fluxes were investigated. When $\gamma h/\sqrt{\alpha}_1 t \ll 1$, the temperature-time history of the thin film is mathematically the same as that of the surface of a semi-infinite slab heated by a constant energy flux. The antenna properties of the thin-film gauge have been analyzed using a simple antenna model and equivalent circuit. The relation between the Poynting flux and the apparent constant energy flux was investigated experimentally for two cases, and it was found that the analysis predicts values of energy fluxes that are about 40% below the measured values. (Author)

AD-286 671 Div. 25
(TISTM/ODN) OTS price $7.60

Oslo U. (Norway).
X-RAY AND MAGNETIC STUDY OF THE VANADIUM SULFIDE PHASES V5S4 AND VS1+x.
Technical rept.,
by F. Gronvold, H. Haraldsen and others.
14 Feb 62, 72p. incl. illus. tables, 25 refs.
(Contract AF 61(052)178)
(ARL 62-427, pt. 1) Unclassified report

DESCRIPTORS: *X-rays, *Vanadium compounds, *Sulfides, *Magnetic susceptibility, Heat treatment, Lattices, Crystals, Crystal structure, Magnetic properties, Paramagnetic crystals, Synthesis, X-ray photography, Density.

Vanadium sulfides were prepared from high-purity elements in alumina crucibles at temperatures from 1400 to 1000 C, depending upon their S content. X-ray studies of the samples after heat-treatment at 800 C showed the presence of the phases V5S4 and VS1+x. The V5S4-phase has a tetragonal structure. The VS1+x-phase exists within the limits VS1.00 and VS1.55 with continuously changing lattice constants. It has a variety of structures of NiAs-like type. At the stoichiometric composition VS it is orthorhombic. The volume is 8 times that of the NiAs-type unit cell. Even larger superstructures with 48 times the sub-cell volume due to 6-doubling of the c-axis are found for VS1.025 and VS1.05. The superstructure remains orthorhombic up to the composition VS1.125. Sulfur excess above the stoichiometric 1:1 ratio causes vacant metal sites. The V atoms are octahedrally coordinated to six S atoms, while the S atoms I and II are coordinated to 5 and 4 V atoms, respectively. Magnetic susceptibility measurements were carried out on some of the samples. Comparatively weak paramagnetism was encountered for all samples. (Author)

AD-286 673 Div. 25
(TISTP/MS) OTS price $12.50

Massachusetts Inst. of Tech., Cambridge.
SOLID-STATE AND MOLECULAR THEORY GROUP.
Quarterly progress rept. no. 46.
15 Oct 62, 173p. incl. illus. tables, refs.
(Contract Nonr-184134 and AF 19(628)356; NSF Grant no. G-10821)
Unclassified report

DESCRIPTORS: *Scientific research, *Solid state physics, *Molecules, *Semiconductors, *Crystal structures, Magnetic properties, Rare earths, Ions, Brillouin zones, Argon, Load, Gallium, Hydrogen, Superconductivity.

AD-286 699 Div. 25
(TISTP/MS) OTS price $3.60

Electro-Optical Systems, Inc., Pasadena, Calif.
THERMAL RADIATION GUIDES FOR POWER TRANSMISSION.
Quarterly technical progress rept. no. 2,
1 July-30 Sep 62,
by W. J. Swenson. 15 Oct 62, 33p. incl. illus.
(EOS rept. no. 3000-Q-2)
(Contract AF 33(657)8526, Proj. 8128)
Unclassified report

DESCRIPTORS: *Optical systems, *Curved mirrors, *Solar furnaces, Thermodynamics, Design, Manufacturing methods, Vapor plating, Mathematical analysis.

The technique discussed involves the transmission of radiant energy through a tube from a heat source (such as a nuclear reactor or a solar concentrator)to some other location in a spacecraft, without an intermediate Carnot cycle limited conversion process. This technique is particularly useful for applications in which a significant portion of the total energy requirement is in the form of thermal energy. Work discussed includes:
The basis of a detailed thermodynamic analysis;
Further development of electroforming techniques;
The possibility of fabrication methods other than electro-forming;
Application studies of guides to laser and thermionic power systems;
Hardware testing in which good practical efficiencies have been measured; and
Additional factors to be entered in a geometric analysis. (Author)

AD-286 723 Div. 25
(TISTP/WH) OTS price $4.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
THE DIFFUSION OF MAGNETIC FIELDS IN MOVING CONDUCTORS,
by Melvin Sandler. 4 June 62, 43p. incl. illus. 4 refs. (Research rept. no. PIBMRI-1000-62)
(Contract AF 30(602)2149)
(RADC TDR 62-288) Unclassified report

DESCRIPTORS: *Pulse generators, *Electromagnetic fields, *Conductors, *Electromechanical converters.

A source of high energy electrical pulses is needed in such fields as thermonuclear research and radar. An efficient method of producing these pulses is to directly convert mechanical energy into an electrical form. This process of electromechanical energy conversion requires strong interaction between a magnetic field and moving conductors. A model of an electromechanical pulser is studied with emphasis upon the process of diffusion of fields into the physical conductor. (Author)

AD-286 724 Div. 25
(TISTP/TL) OTS price $1.10

California U., Berkeley.
THEORETICAL PHYSICS OF ELEMENTARY PARTICLES.
Final rept., 1 Apr 58-31 May 62,
by Robert Karplus. 31 May 62, 4p.
(Contract AF 49(638)327, Proj. 37504)
(AFOSR-2651) Unclassified report

DESCRIPTORS: *Particles, *Physics, Theory, Bibliography, Functions, Complex variables, Energy.

A list is given of articles published during 50 months' work in the theoretical physics of elementary particles. The bulk of the work was concerned with the treatment of the functions used to describe reactions between elementary particles as analytic functions of complex energy and angle variables. Two other types of problems on which work was done were the study of strong and weak interactions of elementary particles to interpret experimental results obtained with the large accelerators and the peculiar effects of interactions among elementary particles in systems containing many such particles. (Author)

AD-286 796 Div. 25
(TISTM/ODN) OTS price $2.60

RIAS, Inc., Baltimore, Md.
RECOVERY OF DEFECTS FROM 78 K TO 300 K IN CADMIUM ELONGATED AT 78 K,
by H. R. Peiffer and F. R. Stevenson. Sep 62, 18p. illus. tables, 20 refs. (Technical rept. no. 3)
(Contract Nonr-370700)
Unclassified report

DESCRIPTORS: *Cadmium, *Crystals, Resistance, Low temperature research, Wire, Energy, Bibliography, Deformation.

The motion of defects in Cd deformed at 77 K was studied from 77 to 300 K using electrical resistivity measured at the deformation temperature as an index of the defect concentration. There appear to be 3 stages of recovery, the first 2 centered at 98 and 138 K with activation energies of 0.21 ev and 0.35 ev respectively. The latter recovery stage shows a similarity to recovery found in cold-worked Cu whereas the former stage is similar to Cu only in that the number of jumps the defect makes before annihilation is the same. A more complicated recovery stage occurs from 228 to 258 K with an energy increasing from 0.70 to 0.89 ev. Above this latter stage, the resistance rises due to recrystallization and reorientation of the crystal. (Author)

AD-286 815 Div. 25, 4
(TISTM/TCG) OTS price $6.60

Linde Co., Tonawanda, N. Y.
RESEARCH STUDY OF THE CRYOTRAPPING OF HELIUM AND HYDROGEN BY SOLID OXYGEN AND NITROGEN AT 20 K.
Interim rept.,
by R. A. Hemstreet, D. J. Webster and others.
Oct 62, 60p. incl. illus. 12 refs.
(Contract AF 40(600)945, Proj. 7778)
(AEDC TDR 62-199) Unclassified report

DESCRIPTORS: *Helium, *Hydrogen, *Oxygen, *Nitrogen, *Cryogenics, Condensation, Theory, Solidified gases, Adsorption, Surfaces, Ionization, Test equipment, Pumps, Vacuum pumps, Diffusion pumps, Space environmental conditions, Low pressure research.

A study of the variables affecting cryotrapping of He and H during 20 K condensation of O and N is presented. The mechanism of He trapping appears to involve burying He atoms in the solid O or N. The process is most efficient at high condensation rates, but is not likely to find application for the removal of He in a large space chamber. Experimental results indicate that H trapping occurs by adsorption of H molecules on the surface of the solid O or N and is most efficient at low condensation rates and low heat flux to the solid surface. These conditions indicate that H trapping may be applicable for H removal in a large space chamber. Attempts to improve He trapping by ionizing the atoms and collecting them on a charged 20 K surface were unsuccessful. (Author)

AD-286 830 Div. 25, 4
(TISTM/ODN) OTS price $2.25

Southern Research Inst., Birmingham, Ala.
A FUNDAMENTAL STUDY OF THE INFRARED SPECTRA OF SUBSTITUTED AROMATIC COMPOUNDS.
Final rept., 15 Apr 61-14 Apr 62,
by W. C. Coburn, Jr., C. V. Stephenson and others.
Aug 62, 82p. incl. illus. tables, 24 refs.
(Contract AF 33(616)8205, Proj. 7360)
(ASD TDR 62-381) Unclassified report

DESCRIPTORS: *Infrared spectroscopy, *Benzenes, *Organic compounds, Bromides, Iodides, Cyano radicals, Fluorides, Chlorides, Methyl radicals, Alkoxy radicals, Nitro radicals, Carbon compounds, Physical properties.

Attempts were made to correlate tne intensities of far IR absorption bands of momo- and disubstituted benzenes with physical properties of the molecules or of their substituents. Intensities were measured for monosubstituted benzenes having these substituents: -F, -Cl, -Br, -I, -CN, CH_3, $-CF_3$, $-CCl_3$, $-NO_2$, and $-OCH_3$. Some second-degree correlations but no useful simple correlation were found. Correlations were sought for the intensity of symmetrical 1,4-disubstituted benzenes, a vibration probably not as likely to mix with other modes of its symmetry species. However, the intensities did not correlate well. Complete IR of all 38 compounds studied are catalogued from 4000 to 265 reciprocal cm. (Author)

AD-286 846 Div. 25
(TISTP/WH) OTS price $.75

Aeronautical Research Lab., Office of Aerospace Research, Wright-Patterson Air Force Base, Ohio.
THE PROFILE OF THE ARC COLUMN,
by G. Schmitz, ed. by J. Birkeland. Aug 62, 15p. incl. illus. (Rept. no. ARL 62-401)
Unclassified report

DESCRIPTORS: *Electric arcs, *Temperature, *Thermal conductivity, *Nitrogen, *Electrical conductance, *High temperature research.

A method is given for calculating the temperature profile of a cylindrically symmetric electric arc when the electrical conductivity Sigma(T), thermal conductivity K(T) and the specific radiation U(T) of the arc gas are known. The method, which involves the approximation of these gas properties by linear functions of temperature over certain temperature ranges, is then applied to a N arc and the results are shown to be in good agreement with experiment. A method for obtaining Sigma(T) and U(T) when the temperature profiles for a series of axis temperatures are known is also given. (Author)

AD-286 847 Div. 25, 10
(TISTM/SJR) OTS price $19.75

Aeronautical Research Lab., Office of Aerospace Research, Wright-Patterson Air Force Base, Ohio.
THERMODYNAMIC PROPERTIES OF SELECTED SPECIES CONTAINING CARBON, HYDROGEN, OXYGEN, HELIUM AND ARGON.
Report on Aerospace Simulation Techniques Research,
by Bernard T. Wolfson and Robert G. Dunn.
Aug 62, 1v. incl. tables, 15 refs. (Rept. no. ARL 62-390)
(Proj. 7065)
Unclassified report

DESCRIPTORS: *Gaseous rocket propellants, Tables, High temperature research, Detonation, Energy, Enthalpy, Entropy, Heat of formation, Argon, Carbon, Helium, Hydrogen, Oxygen, Peroxides, Ozone, Specific heat, Chemical equilibrium, Thermodynamics.

Work on detonation in gaseous mixtures requires reliable and consistent values, at small temperature intervals, of the thermodynamic properties of a number of species involving C, H, O, He and A. Results are presented of calculations of 6 thermodynamic functions at 10 K intervals for 27 selected species, including monatomic carbon in both the gaseous and solid phases. The basic thermodynamic data from which the computations were made (heat capacity, free energy and enthalpy data) were gathered from reliable sources, all such data being found at 100 K intervals. Other thermodynamic functions were computed from the basic data, and all of the 100 K data were treated to insure internal consistency throughout. Highly consistent values of all of the thermodynamic functions at 10 K intervals were then obtained by the Aitkens fourth degree interpolation method. The temperature range covered for the majority of the species is 100 to 6000 K. The thermodynamic functions presented, in dimensionless form, are molal heat capacity at constant pressure, free energy, enthalpy, heat of formation, entropy, and equilibrium constant. (Author)

AD-286 849 Div. 25
(TISTP/WH) OTS price $7.60

Heat Transfer Lab., U. of Minn., Minneapolis.
TEMPERATURE DISTRIBUTION IN A LOW MASS FLUX ARGON PLASMA JET.
Final technical report on Mechanics of Flight,
by E. R. F. Winter and C. J. Cremers. July 62, 71p. incl. illus. 23 refs.
(Contract AF 33(616)5528, Proj. 7063)
(ARL 62-388) Unclassified report

DESCRIPTORS: *Temperature, *Plasma jets, *Argon, *Calorimeters, *Molecular spectroscopy, Nitrogen, Spectrographic analysis.

The temperature distribution in a 12-kw A plasma jet was determined. The jet was a low-mass-flux high-enthalpy type and exhausted into the atmosphere. The measurements were made with a grating spectrograph and temperatures were determined by the 2-line method. A calorimetric heat exchanger and a radiation receiver were used to establish an energy balance for the plasma torch. The existence of thermodynamic equilibrium was established for a 60-kw N plasma jet. This was done by using the rotational band spectra of carbon impurities present in the jet. The experimentation and the evaluation of the spectroscopic measurements is discussed in considerable detail, since this method is not yet as widely known as other methods of temperature determination. (Author)

AD-286 859 Div. 25
(TISTM/SJR) OTS price $3.60

Boeing Scientific Research Labs., Seattle, Wash.
APPARATUS FOR LOW TEMPERATURE TENSILE DEFORMATION AND SIMULTANEOUS MEASUREMENTS OF THERMAL PROPERTIES OF METALS,
by J. C. Erdmann and J. A. Jahoda. Sep 62, 21p. illus. 27 refs. (Document no. D1-82-0180)
Unclassified report

Also available from the author.

DESCRIPTORS: *Tensile properties, *Low temperature research, *Metals, *Cryostat, Test equipment, Test methods, Electrical conductance, Thermal conductivity, Thermal diffusion, Phase transitions, Helium, Lattices, Copper alloys, Nickel alloys, Metallic crystals, Deformation.

A cryostat was constructed and is described which permits the tensile deformation of metal specimens under loads up to 150 kg and simultaneous measurements of the thermal and electrical conductivity, thermal diffusivity, and heat of deformation, preferably at temperatures of liquid He. The apparatus is designed to keep liquid He for approximately 20 hours, which permits the investigation of occurrences requiring high resolution in time as, for example, the discontinuous slip at low temperatures. The measurement of the temperature and small temperature differences is achieved through the application of gas thermometers in connection with electronic differential pressure sensors of small dead volume. Automatic recording allows for an accurate observation of thermal transients. The thermal conductivity measurements are based on the Kohlrausch method. Some results which are representative for the application of the apparatus are presented. (Author)

AD-286 883 Div. 25
(TISTP/WH) OTS price $10.50

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
ON THE DEFORMATION OF THICK, COMPOSITE, ORTHOTROPIC, CIRCULAR CYLINDRICAL SHELLS. PART I: ORTHOTROPIC, CIRCULAR CYLINDRICAL, HOMOGENEOUS SHELLS. PART II: CIRCULAR CYLINDRICAL, SANDWICH SHELLS WITH ORTHOTROPIC CORES,
by Jacques Crouzet-Pascal, James B. Mahoney and others. Sep 62, 124p. incl. illus. 17 refs. (Technical rept. no. 1; Research rept. no. RE-161)
(Contract Nonr-346500, Proj. NR-064-463)
Unclassified report

DESCRIPTORS: *Elastic shells, *Deformation, *Loading, *Sandwich construction, Cylindrical bodies, Stresses, Elasticity, Partial differential equations.

In Part I, a system of equations, which governs the stresses and the small deformation of an orthotropic, circular cylindrical, homogeneous shell under arbitrary load and support conditions, is developed. This system consists of two-dimensional shell equations and boundary conditions deduced, by means of Reissner's variational theorem, from consistent stress and displacement assumptions which include nonvanishing transverse normal stress and shear deformations. In Part II, the equations developed in Part I are incorporated in the formulation of the field equations and associated boundary conditions for the static analysis of thick, circular cylindrical, sandwich shells with orthotropic cores. These equations comprise five equilibrium equations in terms of stress resultants, sixteen stress resultant-displacement equations, and six equations that describe the force interaction of the orthotropic core with an orthotropic inner face layer and an isotropic outer face layer. Thus, in their most general form, these equations describe the stresses and deformations of a three layered, circular cylindrical shell. (Author)

26. PRODUCTION AND MANAGEMENT

AD-285 645 Div. 26, 14
(TISTM/TCG) OTS price $1.10

Materials Research Lab., Inc., Richton Park, Ill.
DESIGN OF ROLLER FLEXING DEVICE.
Quarterly progress rept. no. 1, 4 June-31 Aug 62 on the Use of Strain Softening to Improve the Properties of Refractory Metals,
by S. Mostovoy and E. J. Ripling. 31 Aug 62, 3p. illus. table.
(Contract NOw 62-0725-c)
Unclassified report

DESCRIPTORS: *Refractory materials, *Metals, *Rolling mills, Sheets, Stresses, Deformation, Design, Industrial equipment, Processing.

Roller flexing refractory metal sheet requires a unique flexing device that resembles a commercial roller leveler. A machine of this type, capable of operating at elevated temperatures, and using small work rolls, was designed, but not built, during this time period. The characteristics of the flexer are described. (Author)

AD-285 657 Div. 26
(TISTM/ODN) OTS price $7.60

Solar Aircraft Co., San Diego, Calif.
DEVELOPMENT OF MANUFACTURING METHODS FOR LIGHTWEIGHT METAL FOIL HEAT EXCHANGERS.
Quarterly progress rept. no. 1, 18 June-17 Sep 62.
1 Oct 62, 1v. incl. illus. tables, 5 refs.
(Contract AF 33(657)8766, Proj. 7-936)
Unclassified report

DESCRIPTORS: *Heat exchangers, *Foils, *Metals, *Gases, *Manufacturing methods, Design, Dies, Coatings, Materials, Temperature, Sheets, Construction, Stainless steel, Alloys, Titanium alloys, Vanadium alloys, Aluminum alloys, Chromium alloys, Brazing, Welding, Air, Nitrogen, Helium.

Significant improvements were made to the design of the heat exchanger. A plastic mockup was completed which showed the principle of operation of the new design. Experimental dies were constructed and used to form experimental pieces. Parts were formed using type 321 stainless steel, Hastelloy X, and Ti-13V-3Al-11Cr. Satisfactory parts were formed in sheets of 0.005-in and 0.002-in type 321 stainless steel and 0.005-in Hastelloy X. Additional work is required for the titanium. Experimental joining methods were tried using the formed stainless steel parts. Both resistance welding and brazing were used. (Author)

AD-285 923 Div. 26
(TISTB/AW) OTS price $2.60

ARINC Research Corp., Washington, D. C.
ACCURACY OF AFM 66-1 REPORTING.
Special rept.,
by Harald R. Leuba and David Van Tijn.
20 July 62, 20p. incl. illus. (Pub no. 206-3-315)
(Contract AF 33(657)7382)
Unclassified report

DESCRIPTORS: *Maintenance, *Management engineering, *Data processing systems, Data, Air force operations, Effectiveness, Design, Errors.

Methods of checking and purifying the data base of Air Force maintenance and logistics management are discussed. This data base consists of the outputs of the data systems operating under the AFM 66-1: The Maintenance Data System and the Exception Time Card System. Events reported form a basis for decision-making in many areas of support management. Results developed under a pilot study of the accuracy of 66-1 reporting are presented. The purpose of this study was to measure the confidence inherent in that portion of ARINC Research's research program which is dependent upon the 66-1 system. The methods used for measuring the information content of 66-1 data do work. The results obtained are suggestive, although due to the pilot nature of the study, they are not conclusive. They do, however, point up the potentialities of this kind of investigation. With additional effort it will be possible to evaluate both the degree and the nature of inaccuracies in 66-1 reporting, and thus to obtain a measure of the confidence with which these data may be employed in Air Force support management. (Author)

AD-285 998 Div. 26
(TISTE/CAM) OTS price $5.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
TECHNOLOGY AND SCALE IN ELECTRICITY GENERATION,
by Phoebus J. Dhrymes and Mordecai Kurz.
22 June 62, 57p. incl. illus. tables, 17 refs.
(Technical rept. no. 116)
(Contract Nonr-22550, Proj. NR-047-004)
Unclassified report

DESCRIPTORS: *Electric power production, *Steam, *Industrial research, *Economics, Electrical industry, Production, Industrial plants, Labor, Statistical analysis, Costs, Sampling.

The question of returns-to-scale in public utilities is analyzed. The productive process of electric generation is examined and a modified substitution model is employed, permitting differentiation between returns-to-scale to labor and to other factors. The method employed isolates the impact of technological progress on (steam) electric generation. It is shown, that increasing

returns-to-scale prevail throughout, and that the main impact of technology was registered during the 1950's. This study covers the period 1937-59. (Author)

AD-286 112 Div. 26
(TISTM/EJH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ADJUSTMENT OF AUTOMATIC DEVICES CONTROLLING THE DIMENSIONS OF DETAILS DURING MECHANICAL MACHINING. CONSTRUCTION OF TOOLS AND METHODS FOR THEIR ADJUSTMENT (CHAPTERS I AND II),
by V. V. Kondashevskiy. 11 June 62, 11p. (Trans. no. FTD-TT-62-578 from Naladka Avtomaticheskikh Priborov Kontrolya Razmerov Detaley Pri Mekhanicheskoy Obrabotke; Konstruktsii Priborov I Metody Ikh Naladki, pp. 5-15, 1960)
Unclassified report

DESCRIPTORS: *Machine tools, *Cutting tools, *Machining, *Grinders, Automation, Control systems, Industrial equipment, Production, Economics, USSR, Translations.

Contents:
Classification of devices for actively controlling dimension details on metal cutting machines
Economical effectiveness of devices for controlling dimension details in the grinding process

AD-286 113 Div. 26, 27
(TISTM/TCG) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
EFFECT OF MECHANICAL PROCESSING ON THE OPERATIONAL PROPERTIES OF GAS TURBINE BLADES,
by A. I. Isayev and N. A. Morozov. 4 June 62, 11p. incl. tables (Trans. no. FTD-TT-62-576 from Issledovaniye Tekhnologicheskikh Protsessov V Tyazhelom Mashinostroenii Tsentral'nyy Nauchno-Issledovatel'skiy Institut Tekhnologii I Mashinostroeniya. Moscow, No. 102, pp. 45-57, 1961)
Unclassified report

DESCRIPTORS: *Gas turbine blades, *Manufacturing methods, Mechanical properties, Processing, Machining, Grinders, Milling machines, Fracture (Mechanics), Test methods, USSR.

The results of this investigation indicate that the high surface purity of working parts of blades of stationary gas turbines is not absolutely necessary and can be reduced to 6-th class without any hindrance to the operational qualities of the blades. Introduction of new surface purity requirements for working parts of gas turbine blades makes it possible to reduce considerably the labor effort in manufacturing the blade apparatus, to facilitate the solution of the problem pertaining to total mechanization of blade machining. The necessity of planning and preparing special machines for finishing operation of blade working parts is decreased. (Author)

AD-286 124 Div. 26, 17
(TISTM/TCG) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
EQUIPMENT FOR GAS-ELECTRIC WELDING OF MAIN PIPE LINES WITHOUT SUPPORTING WHEELS,
by Yu. N. Marchenko and V. M. Yampol'skiy. 4 June 62, 11p. (Trans. no. FTD-TT-62-521 from Byulleten' Tekhniko-Ekonomicheskoy Informatsii, No. 10, pp. 23-29, 1961)
Unclassified report

DESCRIPTORS: *Electric welding, *Gases, *Pipes, Welding, Automatic, Vehicles, Welded joints, Carbon dioxide, Industrial equipment, USSR.

Technology and equipment were developed for the automatic welding of revolvable joints in CO2 gas without supporting wheels, in which the first layer of the seam is accomplished with the gas-electric automatic device ASP-60. For welding non-revolvable joints of pipe lines, a gas-electric semiautomatic welding tool (PTV-1) and a gas-electric automatic device (AS-60) were built. (Author)

AD-286 165 Div. 26, 17
(TISTM/EJH) OTS price $4.60

Aeroprojects, Inc., West Chester, Pa.
DEVELOPMENT OF ULTRASONIC WELDING EQUIPMENT FOR REFRACTORY METALS.
Interim technical progress rept., 1 May-31 July 62,
by Nicholas Maropis. Aug 62, 42p. incl. illus. 8 refs.
(Contract AF 33(600)43026, Proj. 7-888)
(ASD TR 7-888, vol. 4)
Unclassified report

DESCRIPTORS: *Welding, *Spot welding, *Industrial equipment, Sheets, Refractory materials, Heat resistant alloys, Tungsten, Niobium alloys, Nickel alloys, Molybdenum alloys, Stainless steel, Chromium alloys, Cobalt alloys, Transducers, Power supplies, Ultrasonics.

Work has advanced toward the development, design, and construction of a 25-kilowatt spot-type welding unit and associated power source. The design of the welded framework was completed, in addition to various welding control circuits. Evaluations continued in isolating and resolving problems relating to critical components of the 25-kilowatt unit, among which are ceramic washer type transducer assemblies, acoustic coupling elements, and power-force programming circuitry. Performance studies point to substantiation of Astroloy and Udimet 700 as similarly satisfactory tip alloys for welding refractory metals. Utilization of ceramic transducer assemblies, under the tension-shell concept, established, at the lower-power levels, a power-conversion efficiency in excess of projected limits. The performance of the aluminum-bronze coupler, fabricated during prior study, exceeds that of standard steel units. Performance appears enhanced by sculpturing to provide flexural relief. (Author)

AD-286 183 Div. 26, 25
(TISTM/EJH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ATOMIZATION OF LIQUIDS,
by A. S. Pen'ko. 22 June 62, 10p. incl. illus. 3 refs. (Trans. no. FTD-TT-62-681 from Inzhenerno-Fizicheskiy Zhurnal 4:3, pp. 47-51, 1961)
Unclassified report

DESCRIPTORS: *Atomization, *Liquids, *Aerosols, Steam, Air, Water, Gas flow, Drops, Centrifuge separation, Centrifuges, USSR, Translation, Production.

Atomization of liquids in 3 different types of atomizers is discussed. Recommendations are made for improving the degree of atomization. Mechanical atomizers: Operation of these atomizers has shown that the smaller the section of the guide (swirling) channels, the greater

the degree of atomization of water. Steam-air atomizers: An efficient design provides for maximum air-stream velocity at the site of liquid atomization, minimum liquid-stream velocity at the site of its atomization, maximum cross-sectional surface of the liquid stream at the site of its atomization. Centrifugal atomizers: At a constant rotational velocity, the atomizer produces a uniform atomization with equal-size particles; practically any degree of atomization is possible.

AD-286 252 Div. 26, 27, 17
(TISTM/TCG) OTS price $3.60

Aerojet-General Corp., Downey, Calif.
EXPLOSIVE FORMING OF CLOSURES FOR LARGE SOLID PROPELLANT MOTOR CASES,
Quarterly progress rept. no 2, 17 July-17 Oct 62,
by A. W. Hall and I. Lieberman. 25 Oct 62, 6p. illus. tables (Rept. no. 0665-01(02)QP)
(Contract AF 04(611)8394)
Unclassified report

DESCRIPTORS: *Solid rocket propellants, *Rocket cases, *Explosive forming, Dies, Steel, Heat resistant alloys, Ice, Welds, Welded joints, Forging, Stresses, Plastics, Molding, Thickness, Explosives, Rocket closure cups, Manufacturing methods.

Results obtained on explosive forming tests to produce 36-in. diameter hemispherical domes in mild steel and high strength steel are summarized. The results indicate that: (1) The free-forming die may be used successfully to form domes with a configuration less than a hemisphere; (2) The use of an ice die produced dome contours within 0.180-in. of desired contour; (3) Welded mild steel and high strength steel blanks may be explosively formed to a hemispherical configuration without detriment to the weld or parent material; and (4) Control on initial blank thickness to compensate for thinning and thickening which normally occur during the forming process permitted forming domes to a thickness of 0.154 in. ± .002-in. A description of a full-scale 120-in. diameter free-forming and ice designed to produce hemispherical domes is presented. (Author)

AD-286 268 Div. 26, 8
(TISTM/ODN) OTS price $1.10

GB Electronics Corp., Garden City, N. Y.
(No title).
Progress rept.
31 July 62, 3p. illus.
(Contract NObsr-85320)
Unclassified report

DESCRIPTORS: *Welds, *Welding, Welded joints, Tools, Sheets, Metals, Processing, Waveguides, Waveguide joints, Aluminum, Electron guns, Joints.

Initial T welds were made with a fillet radius or chamfer of .020, using machine settings of 100 kv, 3.5 ma, and 40 ipm. A 2 septum assembly using one piece mandrels was also welded. Extraction of the mandrel proved troublesome as the assembly was mutilated and distorted. Split mandrels were used to accomplish the following series of welded assemblies. The final series of T weld specimens, on 6 in long 4 septum assemblies, required changing the welding parameters established in the initial and second series specimens as heat transfer to the fixture became evident. Motion irregularities of the drives affected the consistency of the welds and overhauling of the drive system was required. The electron gun assembly was removed and polished as arcing was noticed when welding more than one T in an assembly. (Author)

AD-286 283 Div. 26, 17
(TISTM/EJH) OTS price $3.60

General Dynamics/Fort Worth, Tex.
MATERIAL - VASCOJET 1000 FLASHWELDED - EVALUATION OF,
by John F. Hildebrand. 28 Sep 62, 29p. incl. illus. tables, 2 refs. (Rept. no. FGT-2490)
(Contracts AF 33(600)36800 and AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Welds, *Steel, *Welded joints, Chromium alloys, Molybdenum alloys, Vanadium alloys, Tensile properties, Fatigue (Mechanics), Heat treatment, Test methods, Elevons.

The object of this investigation was to determine the tensile and axial tension-tension fatigue properties of flashwelded joints in Vascojet 1000 plate heat treated to an ultimate tensile strength between 260,000 and 280,000 psi. Thirty-eight test coupons, .250 x 3 x 10 inches, were flashwelded. The flashwelds were generally of poor quality in that the weld centerline failures exhibited flatspots. The upset zone of the flashwelded joints was the weakest zone in 21 out of 31 specimens. Upset stringers and grain coarsening, in part, account for the lower fatigue strength of the joints. The notch sensitivity was reduced and the fatigue strength at high stress levels improved by drawing the joints to a lower strength level. The endurance limit of the joints tested was between 50,000 and 60,000 psi at a stress ratio of R = 0.1 and at the 260,000 to 290,000 psi strength level. The tensile strength joint efficiency averaged about 66%. The magnaflux inspection revealed some of the weld defects. (Author)

AD-286 383 Div. 26, 15
(TISTP/GRW) OTS price $3.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
ECONOMIC MODELS FOR INDUSTRIAL WAITING LINE PROBLEMS,
by Frederick S. Hillier. 27 Aug 62, 34p. incl. illus. 17 refs. (Technical rept. no. 62)
(Contract Nonr-225(3), Proj. NR-042-002)
Unclassified report

DESCRIPTORS: *Industrial research, *Probability, Scheduling, Economic conditions, Operations research.

AD-286 403 Div. 26, 17
(TISTM/EJH) OTS price $4.60

Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
TUNGSTEN FORGING DEVELOPMENT PROGRAM,
Interim technical progress rept. no. 6, 5 June-5 Sep 62,
by F. N. Lake. Sep 62, 47p. incl. illus. tables, 7 refs. (Rept. no. ER 5052)
(Contract AF 33(600)41629)
(ASD TR 7-797, vol. 6) Unclassified report

DESCRIPTORS: *Tungsten, *Tungsten alloys, *Forging, Refractory materials, Configuration, Manufacturing methods, Extrusion, Dies, Mechanical properties, Hardness, High temperature research, Sheets, Spaceships, Guided missiles.

The program was revised and extended to adapt the developed forging process to non-structural,

thin section tungsten components. A Universal Thin Section configuration and tooling sequence was designed for determination of all basic parameters involved in forging of thin section tungsten shapes. Forging tooling was manufactured. Centrifugally cast and extruded W-2%Mo was selected as the forging billet material for the program. The initial large diameter cast ingot was procured to strict specifications and was successfully extruded to sound forging bar stock. (Author)

AD-286 453 Div. 26, 17, 14
(TISTM/ODN) OTS price $4.60

Armour Research Foundation, Chicago, Ill.
DEVELOPMENT OF 2400 F FORGING DIE SYSTEM.
Interim technical progress rept., 28 June-27 27 sep 62,
by H. B. Nudelman, A. H. Murphy and others.
Oct 62, 39p. incl. illus. tables.
(Contract AF 33(600)42861)
(ASD TR 7-886, Vol. 6) Unclassified report

DESCRIPTORS: *Forging, *Dies, *High temperature research, Titanium compounds, Carbides, Borides, Silicon compounds, Materials, Refractory materials, Ceramic materials, Steel, Fracture (Mechanics), Failure (Mechanics), Stresses, Pressure, Metal coatings.

Work aimed toward the reduction of the normally required number of die sequences, necessary to produce the selected part, through the use of an extrusion-forging technique and hot dies was completed and is reported. It was demonstrated that the selected forging can be produced directly from hot-rolled bar stock. A number of conditions, however, must be fulfilled in the forging of this particular configuration: (1) there must be sufficient mass in the preform, (2) the preform must have sufficient length 6-1/2 to 7 inches, and (3) the preform must be positioned at the back of the die. Three candidate nonmetallic materials TiB2, KT-SiC, and Refrax were subjected to further evaluation with respect to hot forging application. It was demonstrated that these materials operating at 2400 F will successfully upset, and simple forgings of mild steel were produced which had flow stress approximating that of a refractory alloy at 3000 F, namely 10,000 psi. Castings for hold-down rings, heater blocks, back-up blocks, and water-cooled bottom plates for the 2400 F die system were produced and are ready for machining into prototype dies to study the die heating problems. (Author)

AD-286 590 Div. 26, 17, 14
(TISTM/EJH) OTS price $10.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
SHORT HANDBOOK OF TECHNOLOGY AND MACHINE BUILDING,
by A. P. Fedotikov. 5 Sep 62, 120p. incl. illus. tables (Trans. no. FTD-TT-62-222 from Kratkiy Spravochnik Tekhnologa-Mashinostroitelya, Oborongiz, Moscow, pp. 60-61, 64-65, 69, 78-97, 135, 173, 176-191, 194, 224-226, 262-317, 338, 358-359, 361-390, 1960)
Unclassified report

DESCRIPTORS: *Handbooks, *Tables, *Machining, *Welding, *Metals, *Plastics, *Alloys, Materials, Arc welding, Silver solders, Soldering alloys, Mechanical properties, Manufacturing methods, USSR.

AD-286 725 Div. 26, 22, 29
(TISTB/AW) OTS price $1.00

Picatinny Arsenal, Dover, N. J.
AUTOMATED PROCEDURE FOR STANDARDIZING FEDERAL SUPPLY ITEMS,
by Sidney Karlin. Sep 62, 1v. incl. illus. tables, 2 refs. (Technical rept. no. 3006)
Unclassified report

DESCRIPTORS: *Federal supplies, *Supplies, *Standardization, Automation, Classification, Data, Pyrotechnics, Flares, Coding.

An automated procedure was sought for rapidly determining potential standardization of items in the Federal Supply Classification System. The procedure developed can be applied to all classes in the FSC system. Use of key punch cards and Electric Accounting Machine equipment makes possible the arrangement of data in a format which facilitates analysis. It was observed that similar items sometimes have different Dept. of Defense codes; in addition, more than one Federal Stock Number has been assigned to items with the same DOD code. Consequently there is opportunity to reduce the number of stock codes. (Author)

AD-286 787 Div. 26, 17, 14
(TISTM/ODN)

Lockheed Aircraft Corp., Sunnyvale, Calif.
DEVELOPMENT OF LIGHT WEIGHT HIGH-TEMPERATURE STRUCTURES. PHASE I. DESIGN CRITERIA.
Interim technical documentary progress rept., 1 July-30 Sep 62,
by E. H. Nickell and A. B. Burns. Oct 62, 71p. incl. illus. tables, 13 refs.
(Contract AF 33(657)9145, Proj. 7-938)
(ASD TDR 7-938, vol. 1)
Unclassified report

DESCRIPTORS: *Sandwich panels, *Foils, *Sandwich construction, *Honeycomb cores, Materials, Design, Manufacturing methods, Buckling, Theory, Shear stresses, Refractory materials, Molybdenum, Metal coatings, Alloys, Mechanical properties, Tantalum, Coatings, Nickel, Platinum, Temperature.

Work accomplished during the first phase of contract AF 33(657)-9145 is discussed. Phase I of the program was devoted to the detail design of foil-gage light weight structures which will be manufactured in Phase II and experimentally evaluated in Phase III. The following factors influenced design: thermal environment, time at temperature, selection and availability of materials, manufacturing ability, and structural efficiency. On the basis of efficiency studies of structures subjected to compression, shear, and normal loadings, honeycomb sandwich construction was selected as the foil-gage configuration yielding minimum weight. Since this structure must withstand exposure to 2000 F for two hours, superalloys and refractories were prominent candidate materials. From among these materials which can be obtained commercially in foil gages, pure Mo, coated with protective metals or alloys, was selected for the facings, and Inconel 702 for the core. The theoretical methods used to predict the various modes of buckling in the structure were reviewed and compared with empirical methods and the available test data. Those methods most closely agreeing with the test data were used in the design. (Author)

AD-286 793 Div. 26, 15
(TISTP/TL) OTS price $4.60

RAND Corp., Santa Monica, Calif.
THE SIZES OF SIMULATION SAMPLES REQUIRED TO

COMPUTE CERTAIN INVENTORY CHARACTERISTICS WITH STATED PRECISION AND CONFIDENCE,
by Murray A. Geisler. Oct 62, 43p. incl. tables, 9 refs. (Memo. RM-3242-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Simulation, *Management engineering, *Real variables, *Statistical analysis, *Mathematical prediction, *Numerical methods and procedures, Statistical distributions, Data, Statistical functions, Design, Sampling.

The design and operation of simulation models for studying management policies and other problems that involve complex systems of random variables is presented. A major use of such models lies in measuring parameters which help to identify and select among preferred management policies. The estimation of these parameters is a statistical problem, and one of the significant statistical decisions is the size of sample to be drawn from the simulation model for making such estimates. Also studied are calculations of sample sizes, measured in number of simulated time periods, required to estimate certain parameters of selected inventory models with specified precision and confidence. In particular, the inventory models used include the classical zero procurement lead-time case, plus selected non-zero procurement lead-time cases having 2-, 5-, and 10-period lead-times. The parameters estimated are the mean number of shortages and of overages per time period, an overage being the amount of stock on hand at the end of the period, with negative amounts (or shortages) equated to zero. (Author)

AD-286 812 Div. 26, 17
(TISTM/TCG) OTS price $2.60

General Dynamics/Fort Worth, Tex.
EFFECTS OF ANDROFORMING ON MATERIAL PROPERTIES.
Interim technical engineering rept. no. 4, 18 June-18 Sep 62,
by C. Lantz. 18 Sep 62, 25p. incl. illus, tables.
(Contract AF 33(600)42847, Proj. 7-910)
(ASD TR 7-910, vol. 4) Unclassified report

DESCRIPTORS: *Metal forming presses, *Machines, *Sheets, *Metal plates, Aluminum alloys, Steel, Titanium alloys, Mechanical properties, Alloys, Materials, Operation, Processing, Deformation, Laminates, Control systems, Zinc alloys, Aluminum alloys, Copper alloys, Manufacturing methods.

This investigation encompasses the statistical deviation of the Model J Androform machine's forming parameters, the correlation of machine settings to produce specific contours, and the effects of Androforming on material properties. Current work performed in developing contoured Stage I forming elements is covered. These elements were required to increase the forming capabilities of the machine. Cast Kirksite was found most suitable under wear and endurance characteristics. A set of 800 in. radius Stage I elements was made from Kirksite for forming .040 gage Al sheets in widths to 72 in. Maximum compound contours were formed from 36-, 48-, and 72-in. width material by using the temporary Stage I element with existing Stage II and Stage III forming elements. The forming limits thus established, were considerably greater than those obtained with straight Stage I elements. (Author)

27. PROPULSION SYSTEMS

AD-285 839 Div. 27, 11, 17
(TISTM/TCG) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MATERIALS OF THE ''HOT'' PARTS OF GAS-TURBINE AUTOMOBILE ENGINES,
by M. A. Kossov and B. S. Kurchman. 12 July 62, 15p. incl. illus. tables (Trans. no. FTD-TT-62-504 from Avtomobil'naya Promyshlennost 10: pp. 29-33, 1961)
Unclassified report

DESCRIPTORS: *Gas turbines, *Passenger vehicles, Materials, Heat resistant alloys, Creep, Heat, Stability, Nozzles, Alloys, USSR.

The use of new materials in the automobile industry, particularly, austenite heat-resistant alloys and new technological processes such as precision molding and stamping of heat-resistant alloys, high-temperature heat processing, electrical-pulse working, and so forth, require the introduction of new methods of control. In the organization of the production of gas-turbine engines it is necessary to provide for the carrying out of supplementary laboratory tests and checking operations: the checking of the long-lasting heat resistance, the express analysis of the heat-resistant alloys on fusing, the scouring for revealing recrystallization and defects, research of the macro- and microstructure, luminescent and light defectoscopy, X-ray check of the castings, and ultraviolet check of the stamped disks. The use in the automobile industry of new materials and technology requires extensive development of scientific research for the creation of new heat-resistant and heat-stable alloys, the lowering of their cost, and new technical methods of machining. (Author)

AD-285 876 Div. 27, 17
(TISTM/TCG) OTS price $1.10

Stanford Research Inst., Menlo Park, Calif.
TUNGSTEN AND ROCKET MOTORS.
Progress rept. no. 21, 1 July-31 Aug 62,
by Gerald M. Gordon and David A. Brown.
31 Aug 62, 2p.
(Contract NOrd-18619)
Unclassified report

DESCRIPTORS: *Rocket motors, *Tungsten, Thermal stresses, Shock, Pyrometers, Test equipment, Photographic analysis, Exhaust gases, Simulation, Plasma jets, Materials, Erosion.

Tungsten erosion is being studied under simulated exhaust conditions by means of a specially constructed plasma arc erosion apparatus. Another phase deals with the effects of thermal shock on tungsten and includes an experimental and theoretical analysis of the problem. (Author)

AD-285 944 Div. 27, 26
(TISTM/EJH) OTS price $1.60

Arde-Porland, Inc., Paramus, N. J.
CRYOGENIC STRETCH FORMING OF SOLID PROPELLANT ROCKET CASES.
Quarterly technical rept. no. 1, 1 June-1 Sep 62,
by George Claffy. 1 Sep 62, 17p. incl. illus.
(Contract DA 30-069-ORD-3501)
Unclassified report

DESCRIPTORS: *Rocket cases, *Cryogenics, *Manufacturing methods, Stainless steel,

Deformation, Configurations, Pressure vessels, Production, Stresses, Cylindrical bodies.

The feasibility of producing high strength cases by cryogenic stretch forming was demonstrated. The present objective is to develop the process to the point where a predetermined, complex configuration can be produced while retaining the high strength achieved in the earlier prototype cases. An overall program plan was evolved, and procurement-fabrication effort was initiated. This effort has thus far touched on the elliptical head, skirt attachment, and aft closure features of the motor case. The contract was modified to include the task of developing the Pershing motor case configuration. (Author)

AD-285 988 Div. 27
(TISTA/SEB) OTS price $7.60

Aerojet-General Corp., Sacramento, Calif.
AFT-END IGNITION LARGE SOLID-ROCKET PROGRAM.
Final rept. on Phase 2.
Oct 62, 33p. illus. tables.
(Contract AF 04(611)8012)
(SSD TDR 62-103) Unclassified report

DESCRIPTORS: *Rocket motors, *Rocket igniters, Pressure, Interior ballistics, Ignition, Ignition systems, Gas generating systems, Exhaust gases, Gas flow, Solid rocket propellants, Pyrotechnics.

An aft-mounted ignition system is being designed for a 100-in.-dia solid rocket motor. The gas dynamics associated with aft-end ignition are also being studied. Igniter gas penetration, gas dynamics, and ballistic performance of the aft-end igniter were demonstrated in a series of open-air and free-volume-chamber test firings. Ignition capability of the aft-mounted igniter was demonstrated in two ignition-test motor firings. The development program showed that ignition of large solid-rocket motors by aft-mounted pyrotechnic igniters is feasible, and has advantages over the more conventional fore-end ignition. Aft-end ignition provides greater motor reliability because retention and sealing problems of a forward-end high-pressure ignition system are eliminated. In addition, the aft-end igniter design is not limited by size and weight restrictions. The effect of an igniter nozzle expansion cone was evaluated in a final free-volume firing. Results demonstrated that a nozzle expansion cone increases gas penetration. (Author)

AD-286 139 Div. 27
(TISTA/GEC) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
SMALL SCALE EJECTOR MODELS,
by B. S. Stephanovskii. 11 July 62, 21p. incl. illus. 14 refs. (Trans. no. FTD-TT-62-448 from Nauchnyye Doklady Vysshey Shkoly, Mashinostroyeniye i Priborostoyeniye, No. 1, pp. 75-86, 1958)
Unclassified report

DESCRIPTORS: *Exhaust gas ejectors, USSR, Exhaust gases, Ejection, Turbulent flow, Aerodynamics, Fluid flow, Combustion chamber gases, Exhaust nozzles, Design, Model tests, Theory, Mathematical analysis.

Small scale ejection equipment and methods, applicable to mixed gaseous ejection from a cylindrical chamber who's functional process can be very simply calculated, are proposed. (Author)

AD-286 106 Div. 27
(TISTA/SEB) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A CENTRIFUGAL ATOMIZER FOR LIQUID AND COLLOID SOLID FUELS,
by Gerhard Gutter. 23 May 62, 4p. incl. illus. (Trans. no. FTD-TT-62-483 from a Soviet Patent No. 620929/25)
Unclassified report

DESCRIPTORS: *Jet engine fuels, *Fuel injectors, Solid jet engine fuels, Centrifugal pumps, Gas turbines, Colloids, Fuel systems, Jet engines, Atomization.

A centrifugal atomizer is described for liquid and colloid solid fuels burned in the combustion chambers of gas turbines consists of a cone-shaped atomizer body which rotates in a fixed case. The body is made in the form of a cup wheel on a circular projection from the drive shaft. On the fuel-intake side it has an annular cavity to receive and accelerate the fuel; on the combustion-chamber side it has a cavity with a double cone whose generatrices diverge toward the combustion chamber; both cavities are separated by a wall and intercommunicate through inclined apertures whose axes diverge toward the combustion chamber. (Author)

AD-286 193 Div. 27
(TISTP/FR) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE CALCULATION OF TEMPERATURE FIELDS IN A GAS TURBINE DISC COOLED VIA ASSEMBLY GAPS IN THE TAIL JOINTS OF THE BLADES,
by Ye. I. Molchanov. 20 June 62, 9p. incl. illus. table, 2 refs. (Trans. no. FTD-TT-62-794 from Teploenergetika, No. 9, pp. 65-68, 1961)
Unclassified report

DESCRIPTORS: *Gas turbines, *Turbine blades, Disks, Temperature, Heat transfer, Cooling.

The results of calculations of the temperature fields in a gas-turbine disc with steady-state and nonsteady-state heat processes are given. The influence of the heat transfer coefficients on various sections and the influence of the temperature of the medium on the temperature distribution in the disc are shown. (Author)

AD-286 200 Div. 27
(TISTA/SEB) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ELIMINATING AIRCRAFT ENGINE VIBRATION,
by M. Ye. Levit and Yu. A. Kolosov. 26 June 62, 25p. incl. illus. 5 refs. (Trans. no. FTD-TT-62-738 from Tekhnologicheskiye Metody Povysheniya Kachestva Detaley i Uzlov Aviadvigateley, Oborongiz, pp. 130-147, 1961)
Unclassified report

DESCRIPTORS: *Turbojet engines, Gas turbines, Damping, Test methods, Stresses, Tests, USSR, Translations, Vibration.

The existing method of balancing rotors by using two outer correction planes can lower the level of vibrations but cannot eliminate their causes and guarantee vibrationless engine operation. A method is proposed for balancing rotors with additional (median) correction planes at operating speeds by allowing rotor deflection to be decreased, thus reducing rotor stress and vibration levels. (Author)

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-285 610 Div. 28, 30
(TISTB/AW) OTS price $1.60

Operational Applications Office, Air Force Electronic Systems Div., Bedford, Mass.
THE CONCEPT OF AN AUTOMATED PSYCHOLOGICAL LABORATORY,
by Charles R. Brown, John R. Hayes, and William H. Sumby. July 62, 16p. incl. table.
(Projs. 2806 and 9670)
(ESD TDR 62-191) Unclassified report

DESCRIPTORS: *Psychology, *Laboratory equipment, Laboratories, Automation, Digital computers.

The concept of an automated psychological laboratory is discussed. A small, expandable, digital computer will be the nerve center of such automation. The advantages gained from the realization of the concept are discussed in detail. (Author)

AD-285 996 Div. 28, 1
(TISTB/AW) OTS price $2.60

Air Force Proving Ground Command, Eglin Air Force Base, Fla.
A PROGRAM FOR EVALUATION OF HUMAN FACTORS IN CATEGORY II TESTING OF AIR WEAPONS CONTROL SYSTEM 412L (Phase II Configuration),
by Jack A. Adams and William H. McAbee. May 62, 22p. 11 refs. (PGN document no. 62-1)
(Proj. 412LY4)
Unclassified report

DESCRIPTORS: *Human engineering, *Control systems, Automatic, Countermeasures, Effectiveness, Weapons, Combat.

A human factors plan that emphasizes a systems approach is presented for Category II testing of Air Weapons Control System 412L. Human factors variables are examined for three basic configurations of the system: (1) a normal system where all automatic subsystems are fully functioning and the personnel subsystem is playing its assigned role, (2) a normal system that is degraded by electronic countermeasures, and (3) a fully degraded system whose operation is essentially manual. System degradation is considered a realistic expectation for combat uses of AWCS 412L, and the personnel subsystem increasingly contributes to the accomplishment of system goals as degradation increases. If the success criteria are not met for one or more of these three system configurations, human factors variables related to human engineering, training, organizational structure, and maintenance will be studied to diagnose the cause of the system's deficiency. (Author)

AD-286 172 Div. 28
(TISTB/AW) OTS price $1.10

Florida U., Gainesville.
SCALE ANALYSIS OF GROUP TASKS.
Annual rept.,
by Marvin E. Shaw. 1 Oct 62, 4p.
(Contract Nonr-58011)
Unclassified report

DESCRIPTORS: *Group dynamics, *Psychometrics, Reasoning, Design,.

Forty arithmetic tasks were sorted on the dimensions of difficulty and goal path clarity. Results demonstrated the feasibility of using the Thurstone procedure for the analysis of group tasks. Ten a priori task dimensions were identified and described, and a procedure for scaling tasks was worked out in detail. A group of 104 tasks was assembled in a form suitable for analysis. This group of tasks is sorted into 8 categories on each of the 10 a priori dimensions. (Author)

AD-286 491 Div. 28
(TISTB/AW) OTS price $2.60

Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.
ANALYSIS OF ADJUSTMENT DIMENSIONS IN SMALL CONFINED GROUPS,
by Paul D. Nelson and E. K. Eric Gunderson. Mar 62, 27p. tables (Rept. no. 62-3)
Unclassified report

DESCRIPTORS: *Military psychology, *Naval personnel, *Group dynamics, Adjustment (Psychology), Psychometrics, Antarctic regions, Sociometrics.

Personal adjustment to an Antarctic environment is studied. Results suggest an important notion about adjustment in small confined living groups such as those in the Antarctic. Compatibility is at least as important as job performance in the eyes of both leaders and peers. This finding suggests that doing one's job well may be a necessary but not sufficient quality for good overall adjustment in this environment. While there may be differences depending upon the occupation to which one refers, it might be that there is greater tolerance of less adequate job performance for persons who are personally well-received by other group members than for persons not so well-received. Since ratings of job performance and social adjustment are positively correlated in the results, it is speculated that willingness to work is more critical than sheer proficiency of work. In any case, the fact that compatibility is so important poses a challenge for those who are charged with the responsibility of selecting and grouping personnel for small Antarctic stations. Consideration of individual personalities and group composition becomes an apparent need in the selection and assignment process. (Author)

AD-286 492 Div. 28, 16
(TISTB/AW) OTS price $1.60

Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.
THE RELEVANCE OF BEHAVIORAL STATEMENTS IN THE JUDGMENTS MADE BY CLINICIANS, CORPSMEN, AND LINE SUPERIORS,
by Allen E. McMichael. 1962, 15p. tables, 10 refs. (Rept. no. 62-9)
Unclassified report

DESCRIPTORS: *Military psychology, *Naval medicine, *Diagnosis, *Naval personnel, Adjustment (Psychology), Psychiatry, Recruiting, Selection, Reliability.

A series of behavioral statements, taken from experimental military findings, were presented to four different but related populations of judges, in order to study the relationship between the type, amount of information, and the level of expertness in making these judgments. It was predicted that groups with greater amount of formal clinical training would utilize this information more accurately than groups with less amount of training. The four groups of 15 judges, all from naval settings were: psychiatrists, clinical psychologists, medical corpsmen,

and line officers. All four of these groups are normally associated with the evaluation of recruit adjustment, in one way or another, in Naval Training Centers. The clinically trained judges, psychiatrists and psychologists, seem able to identify the behavioral statements relevant to all four categories. All four groups of judges are fairly competent at recognizing the behavioral statements which describe the hopelessly unfit or even patently ill recruit (category 4). Support for three of the assumptions and positive confirmation of the hypothesis in this study was demonstrated. Some evidence indicated that the judgments involved are possibly related to the present roles of these four types of judges in a Naval Training Center. (Author)

AD-286 494 Div. 28
(TISTB/LMH) OTS price $1.60

Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.
LEADERSHIP IN SMALL ISOLATED GROUPS,
by Paul D. Nelson. 1962, 16p. tables, 17 refs. (Rept. no. 62-13)
Unclassified report

DESCRIPTORS: *Leadership, Psychology, Separation, Behavior, Attitudes, Group dynamics, Correlation techniques, Climatic factors.

Behavioral characteristics studies associated with leader esteem were conducted with a sample of ten designated leaders from small Antarctic stations. Supporting the results obtained in other studies of leadership in small, primary, living-working groups under confining and isolated conditions, esteemed leadership was found to be a correlate of a relatively democratic leadership orientation, a leadership style characterized by leader participation with the men, by a personal man-to-man relationship between leader and men, and by a leader who respects and seeks the opinions of his men in matters which directly concern them. The preceding style of leadership is most effective in the small station setting for the fooling reasons: First, it facilitates a psychological distance between leader and men which is compatable with the physical and status distances prescribed by the group situation. Secondly, it seems likely to result in decisions which are supported personally by the men and decisions which are based upon the best information possible under the circumstances. (Author)

AD-286 517 Div. 28, 23
(TISTB/AW) OTS price $2.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS. CRITICAL REVIEW IV. SELECTION, INDOCTRINATION, AND TRAINING FOR ARCTIC REMOTE DUTY,
by S. B. Sells. June 62, 26p. 28 refs. (Rept. no. AAL TDR 62-34)
(Proj. 8243-11; In cooperation with Texas Christian U., Fort Worth, Contract AF 41(657)323)
Unclassified report

DESCRIPTORS: *Military psychology, *Group dynamics, *Arctic specialists, Alaska, Stress (Psychology), Adjustment (Psychology), Military training, Selection, Identification, Personality tests.

Theoretically, individual adaptability to remote, small site duty, involving isolation and environmental stress, such as at AC&W sites in Alaska, can be increased by selection of the most fit and by personnel improvement, through indoctrination, acclimatization, and training programs, as well as by reduction of stress through human engineering and effective management. Review of the research literature on selection, indoctrination, and training for Arctic remote duty indicates (a) that marginal airmen can be rather easily identified, although at the cost of a high false-positive rate and that such airmen could be tagged for exclusion from highly demanding, high-risk assignments, provided that other jobs could be found for them elsewhere in the Air Force; (b) that an experimental site briefing, now in use for indoctrination of airmen assigned to Alaskan sites, merits continuation, with care to maintain quality of presentation; and (c) that a number of individual and group training opportunities are worthy of exploitation. (Author)

AD-286 518 Div. 28
(TISTB/AW) OTS price $4.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS. CRITICAL REVIEW V. PSYCHOLOGICAL PRINCIPLES OF MANAGEMENT AND LEADERSHIP,
by S. B. Sells. June 62, 43p. 31 refs. (Rept. no. AAL TDR 62-35)
(Proj. 8243-11; In cooperation with Texas Christian U., Fort Worth, Contract AF 41(657)323).
Unclassified report

DESCRIPTORS: *Group dynamics, *Leadership, *Military psychology, *Management engineering, Production, Effectiveness, Alaska, Stress (Psychology).

A critical discussion and interpretation of principles of leadership and management with particular reference to the problems of AC&W sites in Alaska is presented, which is based on a review of scientific research in the fields of psychology, sociology and management science, primarily. The major topics covered include relations of management and leadership, group-centered vs. production-centered management, organizational relations, organizational control, and leadership in formal organizations. Selected references are cited and reference is made to an annotated bibliography containing abstracts of significant studies: AAL Reports 61-18 to 61-24, incl. (Author)

AD-286 730 Div. 28
(TISTB/SAT) OTS price $1.60

System Development Corp., Santa Monica, Calif.
CLINICAL DIAGNOSTIC MODELS VIA COMPUTER SIMULATION,
by John F. Cogswell. 28 Sep 62, 11p. tables. (Rept. no. SP-976)
Unclassified report

DESCRIPTORS: *Computers, *Behavior, Diagnosis, Data processing systems, Mathematical prediction, Decision making, Simulation.

An automated system for simulating functions used in psychological diagnosis and the simulation technique as a conceptual tool for empirical model-construction in constructing psychological models for predicting behavior are discussed. The word simulation is used to mean that the machine system performs the behavior usually carried out by the human diagnosticians. The computerized system that automatically performs the functions of data storage, clinical interviewing, diagnostic analysis, and report writing is described. The use of this computerized system as a simulation device for a research project

is discussed. The iterative approach of model construction and the testing of the successive models will provide valuable information about the potential use of computer simulation as a conceptual tool. (Author)

AD-286 808 Div. 28, 16
(TISTB/SAT) OTS price $1.60

Duke U., Durham, N. C.
RESEARCH ON ANIMAL ORIENTATION, WITH EMPHASIS UPON THE PHENOMENON OF HOMING IN PIGEONS.
Final rept., 15 Oct 53-31 Aug 62,
by J. G. Pratt. 18 Oct 62, 18p.
(Contract Nonr-118103, Proj. no. NR 301-244)
Unclassified report

DESCRIPTORS: *Perception, *Sensory perception, *Homing devices, Behavior, Conditioned reflex, Reaction (Psychology), Direction finding, Sun, Pigeons.

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-286 003 Div. 29
(TISTB/LMH) OTS price $1.60

Army Arctic Test Board, Fort Greely, Alaska.
CHECK TEST OF CANADA-STANDARDIZED TRAIL TYPE METAL SNOWSHOES (MODIFIED).
9 June 62, 15p. incl. illus.
(Proj. ATB 3-372)
Unclassified report

DESCRIPTORS: *Snowshoes, Arctic regions, Military requirements, Metals, Plastic coatings, Wire, Test methods.

AD-286 012 Div. 29
(TISTB/LMH) OTS price $1.10

Army Infantry Board, Fort Benning, Ga.
CHECK TEST OF BOOT, COMBAT, LEATHER, DIRECT MOLDED SOLE.
29 June 62, 12p. incl. illus. 10 refs.
(Proj. no. 2879A)
Unclassified report

DESCRIPTORS: *Shoes, *Military requirements, Leather, Rubber, Molding, Combat, Design, Standardization, Test methods, Quality control.

AD-286 072 Div. 29
(TISTB/SAT) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
EFFECT OF FOOD INTAKE ON PERFORMANCE CAPABILITIES,
by Donald R. Young. 1962, 13p. incl. illus. tables, 18 refs.
Unclassified report

Presented at the 1962 Army Science Conference, 20-22 June 1962 at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Food, *Metabolism, Dogs, Nutrition, Respiration, Diet, Water privation, Starvation, Effectiveness.

Evidence was obtained to determine that (1) where physical exertion is involved, the body responds best after a period of fasting, but (2) where mental processes are concerned, there is a decrease in efficiency as fasting progresses. Experimental dogs were trained to run on treadmills and their maximum endurance capacity was measured. The best performance was found in dogs that had been fasting for five days. Additional tests showed that intake of oil, water-soluble vitamins, phospholipids, or cellulose derivatives of natural foods during periods of physical activity reduced endurance capacity 40%. Dogs were also trained to identify lights and sounds, and their discriminative skill was measured over a five day period of food withdrawal. As fasting progressed, the animals became more erratic in problem solving and the probability of error was increased. The test scores show that (1) hunger of 1 to 17 hours duration has no effect on judgment ability, (2) disorganization of behavior begins after approximately three days of food deprivation, and (3) is particularly marked after five days without food. (Author)

AD-286 508 Div. 29
(TISTB/AW) OTS price $13.00

National Research Council, Washington, D. C.
THE UTILIZATION OF CHICKEN FEATHERS AS FILLING MATERIALS. A CONFERENCE SPONSORED BY THE HEADQUARTERS QUARTERMASTER RESEARCH AND DEVELOPMENT COMMAND, U. S. ARMY QUARTERMASTER CORPS, NATICK, MASSACHUSETTS, APRIL 28-29, 1955,
ed. by S. J. Kennedy, Adolf Schubert and Louis I. Weiner. Mar 56, 179p. incl. illus. tables, refs.
unclassified report

DESCRIPTORS: *Feathers, Chickens, Sleeping bags, Chemical analysis, Mechanical properties, Physical properties, Insulating materials, Production, Conferences.

The conference on the modification of chicken feathers was held as part of the broad approach being conducted by the Quartermaster Corps to find a low-cost substitute for waterfowl feathers and down for sleeping bags. Fundamental studies of the chemical, physical and mechanical properties of feathers and down and applied investigations of chemical modification treatments to improve the bulking value and insulation of feathers were discussed. The papers cover a broad range of interest varying from fundamental studies of the structure of feather keratin, through the development of the acid-alum and glyoxal treatments, to marketing and production information on feathers. (Author)

AD-286 505 Div. 29
(TISTB/LMH) OTS price $15.00

National Research Council, Washington, D. C.
FABRICS FOR COATING. MILITARY APPLICATIONS. PROCEEDINGS OF A CONFERENCE QUARTERMASTER RESEARCH AND ENGINEERING CENTER, NATICK, MASSACHUSETTS, OCTOBER 16-17, 1958, SPONSORED BY HEADQUARTERS QUARTERMASTER RESEARCH AND ENGINEERING COMMAND, U. S. ARMY QUARTERMASTER CORPS AND COMMITTEE ON TEXTILE FABRICS, ADVISORY BOARD ON QUARTERMASTER RESEARCH AND DEVELOPMENT DIVISION OF ENGINEERING AND INDUSTRIAL RESEARCH,
ed. by Frank R. Fisher and Stanley Backer. 1959, 225p. incl. illus. tables, refs.
Unclassified report

DESCRIPTORS: *Conferences, *Coatings, Textiles, Physical properties, Climatic factors, Military requirements.

AD-286 640 Div. 29
(TISTB/SAT) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
REGENERATION OF FOOD FLAVORS THROUGH ENZYMATIC ACTION,
by Torsten Hasselstrom, S. David Bailey, and Elwyn T. Reese. 1962, 10p. incl. illus. 12 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Food, *Enzymes, Taste, Odors, Glucosides, Sulfides, Fungi, Acceptability.

The discovery was made that the natural flavor of fresh foods can be regenerated in processed foods through the catalytical action of specific enzymes on specific chemicals called flavor precursors. These, being more stable than the enzymes, survive, at least in part, the food processing operations. The new process applies to a variety of canned, frozen, dehydrated, or irradiated foods. Flavor enzymes may be obtained not only from fresh foods, but also from a variety of sources and even from waste products. It was also found that the flavor enzymes may be obtained from non-food sources, as for example, fungi. The flavor precursors belong to a variety of chemical systems. Most thoroughly investigated are the thioglucosides, the flavor precursors of the Cruciferae, or the cabbage family. A total synthesis of Cruciferae thioglucosides was developed. It was found that synthetic thioglucosides are just as effectively attacked by specific enzyme systems as the natural ones. (Author)

30. RESEARCH AND RESEARCH EQUIPMENT

AD-285 617 Div. 30
(TISTP/MS) OTS price $8.10

Coordinated Science Lab., U. of Illinois, Urbana.
(No title).
Progress rept. for June-Aug 62.
28 Sep 62, 77p. incl. illus. tables.
(Contract DA 36-039-sc-85122)
Unclassified report

DESCRIPTORS: *Scientific research, Gyroscopes, Vacuum systems, Iron, Ruby, Diffusion, Mass spectrometers, Electrodes, Digital computers, Computer logic, Programming, Delay lines, Shock waves.

Contents:
Electric vacuum gyroscope
Surface physics
Computer
Adaptive controls and circuit theory
Stability considerations in the synthesis of time-varying feedback systems
Plato
Vacuum instrumentation
Plasma physics
High magnetic field superconductors
Vacuum electrical breakdown

AD-285 647 Div. 30
(TISTP/FR) OTS price $9.60

RAND Corp., Santa Monica, Calif.
THE RAND-SHARE OPERATING SYSTEM MANUAL FOR THE IBM 7090 COMPUTER,
ed. by G. E. Bryan. Sep 62, 109p. incl. illus. 3 refs. (Memo. no. RM-3327-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Digital computers, *Programming, Handbooks.

The RAND Operating System is a somewhat improved version of the SHARE Operating System (SOS) with the MockDonald monitor. Six processors have been added -- FORTRAN, BEFAP, IPL, PEST, RSWST, TRACE. The system is distributed on a single tape which contains not only the absolute files of the operating system, but also a SQUOZE file containing base (generally MD8 and MD12 level decks) and current SQUOZE decks for each system component and a file containing the MOD packages in CRUNCH form which relate current and base SQUOZE. This is done so that RAND MODS may be examined in detail. The system subroutine RSWST is provided to process these files. A miscellaneous file is provided which contains the initiation deck peripheral programs and certain useful job setups. (Author)

AD-285 650 Div. 30, 28
(TISTB/AW) OTS price $3.60

RAND Corp., Santa Monica, Calif.
LEARNING, GENERALITY AND PROBLEM SOLVING,
by Allen Newell. Sep 62, 34p. incl. illus. 20 refs. (Memo. no. RM-3285-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Learning, *Computer logic, Computers, Games theory, Simulation.

Progress on the design of artificial intelligence mechanisms is summarized. The development of the ability to generalize is a major goal in the designing of artificial learning mechanisms. A major stumbling block is that of providing the machine with representational ability: a method must be found which will enable the machine to create a language of its own which it can use to record its experiences. The problem is somewhat analogous to the programming of languages. Other methods of expressing experience are discussed. An analysis of General Problem Solver (GPS) which is a computer program of the game-playing and theorem-proving class is included. Its relative success makes it useful for exploring the field of artificial intelligence and for simulating human problem-solving techniques. GPS both generalizes and makes preparation for an indefinite future, and can be described, therefore, as a ''learning program'' Though there is no repetition of experience, no success or failure, no amassing of statistical data, it is an important step in the development of a mechanism which can become independent of its designers. (Author)

AD-285 680 Div. 30
(TISTP/WH) OTS price $1.10

Computation Center, Mass. Inst. of Tech., Cambridge.
REAL-TIME, TIME-SHARED COMPUTER PROJECT.
Quarterly progress rept. nos. 6-7,
by Philip M. Morse and Herbert M. Teager.
8 Oct 62, 8p. (Rept. no. DSR-8644)
(Contract Nonr-184169)
Unclassified report

DESCRIPTORS: *Computers, *Display systems, *Printing, *Scheduling, *Digital computers, Design.

Work continued in all phases of this project, ranging from devices through software, in the areas of Graphical inputs, Graphical outputs, Problem- and Procedure-oriented languages, and

the scheduling and allocation of a Central Processor with backup temporary storage devices. Test results indicate that block-printed characters can, with a high degree of reliability, be identified without requiring either excess memory space or machine time, so long as the carefully-drawn input is correlated with a particular user's set. The approaches that proved successful with alphameric fonts of block-printed characters proved insufficient for the more subtle variations associated with larger, mixed fonts of cursive characters, and a broader approach encompassing both extremes has been derived. (Author)

AD-285 686 Div. 30, 25, 14
(TISTM/TCG) OTS price $3.60

Aeronautical Electronic and Electrical Lab., Naval Air Development Center, Johnsville, Pa.
APPLICATION OF THIN MAGNETIC FILMS TO COMPUTER TECHNOLOGY.
Phase rept.,
by Robert W. Horn. 22 Aug 62, 36p. incl. illus. (Rept. no. NADC-EL-6222)
Unclassified report

DESCRIPTORS: *Thin films, *Magnetic tape, *Metal films, *Computers, Magnetic materials, Data storage systems, Naval aircraft, Data processing systems, Memory devices, Nickel alloys, Iron alloys.

The application of thin magnetic films to computer technology is discussed. Its purpose is to discuss the connection between thin magnetic films and modern computer technologies, and to propose a program for gathering technical information for the preparation of detailed specifications for future naval airborne data processing systems. (Author)

AD-285 694 Div. 30
(TISTP/FR) OTS price $11.50

Coordinated Science Lab., U. of Illinois, Urbana.
A PATTERN RECOGNITION COMPUTER USING ALL-MAGNETIC LOGIC,
by J. Divilbiss. May 62, 153p. incl. illus. tables, 15 refs. (Rept. no. R-141)
(Contract DA 36-039-sc-85122, Proj. 3-99-01-002)
Unclassified report

DESCRIPTORS: *Magnetic cores, Ferrite cores, Computer logic, Switching circuits, Reading machines, Digital computers.

The development of a pattern recognition computer consisting of a control computer and a pattern recognition unit or PRU is described. The role of the PRU in the combined system is analogous to that of the arithmetic unit in a conventional digital computer. The three principal divisions of the PRU are (1) a two-dimensional shift register of N x N bits, (2) a k-word memory with N squared bits per word, and (3) a bubbler consisting of N squared bubble registers of length r. Each bubble register is a linear 'self-ordering' register, that is, a register in which a fixed number of identical operations will order the information with all ones at one end of the register, all zeros at the other end. The control computer is of conventional design and is not treated at length. Examples of simple pattern recognition routines are given. (Author)

AD-285 811 Div. 30
(TISTP/MS) OTS price $22.25

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
PROCEEDINGS OF THE 1962 ARMY SCIENCE CONFERENCE UNITED STATES MILITARY ACADEMY, WEST POINT, N. Y. 20-22 JUNE 1962. VOLUME I (PRINCIPAL AUTHORS 'A' THRU 'K').
19 Sep 62, 421p. incl. illus. tables, refs.
Unclassified report

DESCRIPTORS: *Scientific research, *Military research, *Conferences, Army.

AD-285 826 Div. 30
(TISTE/CRJ) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
REMOTE LEVEL MEASURING IN RESERVOIRS,
by O. Kostyrev. 12 July 62, 4p. incl. illus. (Trans. no. FTD-TT-62-849 from Neftyanik 11:pp. 16-17, 1961)
Unclassified report

DESCRIPTORS: *Liquid level gages, *Petroleum industry, Petroleum, Measurement, USSR.

A series of automatic and semi-automatic devices, allowing to control and govern industrial processes from a dispatcher point, were developed for the petroleum industry over the past few years. To the automation media belongs the UDU-2 level meter, which allows to measure the levels in reservoirs from a dispatcher's desk, and to give warnings about upper and lower critical levels. In addition, the UDU-2 is intended for local measuring levels by counter, situated directly in the reservoir. (Author)

AD-285 880 Div. 30, 28
(TISTB/AW) OTS price $1.60

System Development Corp., Santa Monica, Calif.
COMPUTER SIMULATIONS OF A PERCEPTUAL LEARNING MODEL FOR SENSORY PATTERN RECOGNITION, CONCEPT FORMATION, AND SYMBOL TRANSFORMATION,
by Charles Vossler and Leonard Uhr. 1 Aug 62, 17p. incl. tables, 10 refs. (Rept. no. SP-562/000/01)
Unclassified report

This paper will be presented at the International Federation of Information Processing Societies Congress, August 1962, Munich, Germany.

DESCRIPTORS: *Learning, *Perception, *Computer logic, Nerves, Decision making, Machine translation, Automation, Computers, Simulation.

A neuron net model for discovery, generalization and transformation of patterned information is examined, in simplified form, by means of computer simulations. One version of the model is a sensory pattern recognition program that generates its own operators as a function of the unknown inputs presented to it. The program attempts to find measures and to improve its methods on the basis of its successes and failures. A second program, when presented with sentences in two different languages, attempts to discover and develop its own translation procedures. Both programs are instances of a model that builds itself into a structure that reflects, in usable form, information it extracts from the external world. The pattern recognition program was tested for its ability to learn to recognize such patterns as handprinted and handwritten letters, arabic handwriting, cartoon

faces, photos, meaningless shapes, and degraded speech. Results are presented for these tests. Results are also presented for the language transformation program. Finally, the model is discussed as a method for studying and automating processes of discovery and induction. (Author)

AD-285 883 Div. 30, 32
(TISTB/MD) OTS price $1.60

System Development Corp., Santa Monica, Calif.
A MACHINE-BASED DOCUMENT CONTROL SYSTEM,
by M. R. Powell. 17 Sep 62, 16p. incl. illus. table (Rept. no. SP-961)
Unclassified report

Prepared for presentation at the 8th National Seminar of the American Society for Industrial Security, 25-27, 1962, Washington, D. C.

DESCRIPTORS: *Data processing systems, *Security classification, *Documentation.

An EAM Machine-Based Document Control System used to control internally generated accountable classified documents is described. A modified version is used to control documents and publications from external sources. This system encompasses five areas of control: (1) copies in file; (2) copies en-route to an employee; (3) copies issued within the facility; (4) copies transmitted from the facility; and (5) copies destroyed. The system was officially installed on July 1, 1961 and has effectively established and maintained control of over 130,000 document copies printed since that time. In addition, distribution data for more than 450,000 Secret copies printed prior to July 1, 1961 was converted from manual records to the new machine-based system. (Author)

AD-285 960 Div. 30
(TISTW/PCR) OTS price $1.10

Kaman Nuclear, Colorado Springs, Colo.
DEVELOPMENT AND FABRICATION OF NON-DESTRUCTIVE SPECIFIC GRAVITY MEASURING EQUIPMENT EMPLOYING RADIATION TECHNIQUE.
Monthly progress rept., 1-31 July 62, 31 July 62, 3p. (Rept. no. 58-92-PR-47)
(Contract DA 19-029-501-ORD-2631, Proj. TA2-8051)
Unclassified report

DESCRIPTORS: *Density, *Radiation counters, *Non-destructive testing, Amplifiers, Phase shifters, Control panels, Analog-to-digital converters, Measurement, Production.

Amplifiers and phase shift chassis were installed in the control console and wired. The replacement worm gear was installed in the lower probe box (interior) and both probe box assemblies were checked for alignment, wear, and backlash. Final wiring of the control and ADC read-out system was started. (Author)

AD-285 961 Div. 30
(TISTP/WH) OTS price $1.10

Kaman Nuclear, Colorado Springs, Colo.
DEVELOPMENT AND FABRICATION OF NON-DESTRUCTIVE SPECIFIC GRAVITY MEASURING EQUIPMENT EMPLOYING RADIATION TECHNIQUE.
Monthly progress rept., 1-31 Aug 62, 31 Aug 62, 2p. (Rept. no. 58-92-PR-48)
(Contract DA 19-029-501-ORD-2631, Proj. TA2-8051)
Unclassified report

DESCRIPTORS: *Non-destructive testing, *Density, *Analog to digital converters.

AD-285 970 Div. 30
(TISTW/RD) OTS price $7.60

Stoddart Aircraft Radio Co., Hollywood, Calif.
DEVELOPMENT OF A RADIO INTERFERENCE-MEASURING TEST SET - AN/URM-141(XN-1).
Final rept., 6 Jan 60-28 Mar 62, by B. N. Ward, Jr. 28 Mar 62, 74p. incl. illus. tables.
(Contract NObsr-81133)
Unclassified report

DESCRIPTORS: *Radio interference, *Test sets, Superhigh frequency, Extremely high frequency, Parabolic antennas, Electronic circuits, Video networks, Power supplies, Measurement.

Contents:
Antenna development
RF tuner development
Metering unit
Measuring circuits
Video circuits
Impulse calibrator
Power supply

AD-285 971 Div. 30
(TISTW/RD) OTS price $9.60

Stoddart Aircraft Radio Co., Hollywood, Calif.
PRODUCTION OF FIVE MODELS OF THE RADIO INTERFERENCE MEASURING SET AN/PRM-25 (XN-1).
Final engineering rept., 6 Jan 60-31 Oct 61, by D. S. Hish. 31 Oct 61, 120p. incl. illus. tables.
(Contract NObsr-81133, Proj. 316)
Unclassified report

DESCRIPTORS: *Radio interference, *Test sets, Low frequency, Very high frequency, Intermediate frequency amplifiers, Audio amplifiers, Electron circuits, Power supplies, Measurement.

Contents:
Mechanical layout of RI-FI meter
Improved signal pickup devices
Development of rod antenna coupler
Description of ground plane
Development of loop antenna
RF input circuits
Details of RF tuner design
Design of IF amplifier design
Second detector circuits
Audio amplifier design
Beat frequency oscillator
Development of signal weighting circuits
Development of metering section
Incorporation of AGC
Selection and calibration of the front panel meter
Development of visual peak indicator
Power sources

AD-285 989 Div. 30, 15
(TISTP/WH) OTS price $1.60

Naval Ordnance Test Station, China Lake, Calif.
DEVELOPMENT OF DATA SMOOTHING TECHNIQUES FOR DIGITAL COMPUTERS USING LINEAR METHODS,
by D. R. Cruise. 30 Apr 62, 20p. 9 refs. (NOTS TP 2826)
(NAVWEPS rept. no. 7818) Unclassified report

DESCRIPTORS: *Experimental data, *Least squares method, *Digital computers, *Matrix algebra, *Statistical analysis, *Numerical analysis, Programming.

Coefficients for the smoothing of experimental data are derived. The Gram-Schmidt construction, the linear method of least squares and 'orthogonal polynomials' are developed. Matrix

and vector notations are used. Application to high speed electronic computers is emphasized. (Author)

AD-286 035 Div. 30
(TISTM/EJH) OTS price $5.60

Cornell U. Sibley School of Mechanical Engineering, Ithaca, N. Y.
WEIBULL TABLES FOR BIO-ASSAYING AND FATIGUE TESTING,
by Henry P. Goode and John H. K. Kao. Sep 62, 22p. tables, 16 refs. (Technical rept. no. 8)
(Contract Nonr-40143)
Unclassified report

DESCRIPTORS: *Failure (Mechanics), *Fatigue (Mechanics), *Statistical tests, *Tables, Life expectancy, Data, Materials, Electrical equipment, Electronic equipment, Biology, Sampling, Reliability, Quality control, Statistical analysis, Test methods.

An acceptance sampling procedure and tables of related sampling inspection plans for the evaluation of lot quality in terms of reliable life are presented. The Weibull distribution, including the exponential distribution as a special case of the Weibull, is assumed as a statistical model for item lifelength. The evaluation of sample items is by attributes with life testing being truncated at the end of a specified period of time. Tables of factors are also provided from which other sampling inspection plans of desired form can be designed and for use in evaluating the operating characteristics of other specified sampling inspection plans in terms of item reliable life. (Author)

AD-286 059 Div. 30, 18
(TISTB/MD) OTS price $1.10

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
A BASIS FOR THE LONG RANGE PLANNING OF ARMY RESEARCH,
by G. H. McClurg. 1962, 9p. incl. illus. 5 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962 at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Research program administration, Army operations, Military research.

Increased interest in improving the functions of Army long range planning and technological forecasting has prompted an investigation to determine in what ways and to what extent the planning of basic and applied research can be useful activity for the Army. Straightforward planning methods can be adapted to the planning of research, but existing statements of operational requirements are not suitable as goals for research planning. An outline representing the basic operational capabilities needed by an Army should be a useful tool for the research planner in making use of available long range operational guidance. Problems faced by the Army in this planning will be varied and formidable, and will require a high degree of a new and specialized technical competence. (Author)

AD-286 097 Div. 30
(TISTP/FR) OTS price $1.60

Melpar, Inc., Falls Church, Va.
SPEECH DATA PROCESSING IN REAL TIME,
by H. A. Straight. Sep 62, 18p. incl. illus. table, 2 refs. (Scientific rept. no. 3)
(Contract AF 19(604)5579, Proj. 4610)
(AFCRL 62-719) Unclassified report

DESCRIPTORS: *Data processing systems, Speech representation, Computer logic.

The processor is a high-speed, special-purpose transistorized digital computer which uses as an input the voice signals derived from an 18-channel vocoder and a quantizing and normalizing multiplex. Through the use of a magnetic drum and associated circuitry for temporary storage, arithmetic operations, counting, comparing, etc., the system is capable of selecting the voice frequency-spectrum pattern in storage which is the best acceptable approximation to the unprocessed pattern and subsequently of the accumulation of statistics on the input speech sample. Although the processor is unique in its entirety, most of the logic of which it is comprised was implemented by quite conventional methods. There is one set of logic which is unique and sufficiently sophisticated to be of considerable interest. This is the set of logic which detects the best acceptable spectrum pattern approximations in real time. (Author)

AD-286 098 Div. 30, 14
(TISTM/EJH) OTS price $2.75

Stanford Research Inst., Menlo Park, Calif.
SURFACE TEMPERATURE MEASUREMENTS WITH THERMOELECTRIC MATERIALS.
Final rept., 1 June 60-31 May 61.
Aug 62, 109p. incl. illus. tables, refs.
(Contract AF 33(616)7377, Proj. 1347)
(ASD TR 61-373)
Unclassified report

DESCRIPTORS: *Thermocouples, *High temperature research, Reliability, Instrumentation, Aerodynamic heating, Simulation, Surfaces, Temperature, Heat transfer, Thermal conductivity, Noise, Vibration, Calibration, Stability, Materials, Wire, Copper alloys, Nickel alloys, Platinum alloys, Rhodium alloys, Chromium alloys, Aluminum alloys, Bibliography, Coatings.

A study was made of the errors in surface-temperature measurements made with a thermocouple (TC), when both TC wires and surface are exposed to radiant energy. The errors arise from the net heat transfer at the TC junction, and the quality and stability (change in calibration) of the TC materials. The response of surface TC's to transient heating was studied. For a single specimen thickness, transient response is greater for large TC wire diameter during the initial transient heating period but becomes independent of TC wire diameter when the heat flux rate reaches steady state. The magnitude of errors arising from instability, which is independent of the quality of TC materials, depends upon the exposure condition and duration. The calibration of commercial thermocouples, whether noble metal or base metal, will probably change less than 1 F after exposure at less than 1000 F in air for 1000 hours. Failure of TC's due to vibration at 40 cps and 2 to 3g acceleration for up to 4 hours is unlikely up to temperatures of about 1300 F. (Author)

AD-286 295 Div. 30, 15
(TISTP/WH) OTS price $2.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
THREADED LIST STRUCTURES IN THE DESIGN AUTOMATION

OF STROKE LOGIC.
Technical report on Mathematics,
by G. T. Uber. July 62, 1v. incl. illus. table, 6 refs. (Rept. no. 6-90-62-55)
Unclassified report

DESCRIPTORS: *Computer logic, *Digital computers, *Automation, *Algebras, Topology.

A system is described which was developed as part of a program to investigate techniques for minimizing and implementing digital logic. The approach was that of manipulating a data structure which closely represents the final hardware realization. The common use of Sheffer-stroke circuitry, plus the simplicity of a model using a single logical connective, has made it possible to develop a system based upon stroke logic. The initial investigation was concerned with minimizing trees of single-output devices. These can be compactly represented inside a computer by means of threaded list structures which were developed by Perlis and Thornton. The sections discuss the translation of boolean equations into threaded list structures and the manipulation of these structures. (Author)

AD-286 335 Div. 30, 25
(TISTP/WH) OTS price $2.60

J. G. Engineering Research Associates, Baltimore, Md.
MUTUAL IMPEDANCE OF PISTONS, STRIPS AND RINGS ON AN INFINITELY LONG RIGID CYLINDRICAL BAFFLE. PART I. BASIC EQUATIONS AND SOME PRELIMINARY RESULTS,
by Joshua E. Greenspon. Aug 62, 17p. incl. illus. refs. (Technical rept. no. 6)
(Contract Nonr-273300, Proj. 385-412)
Unclassified report

DESCRIPTORS: *Electroacoustic transducers, *Impedance, *Pistons, *Spheres, *Underwater sound generators, Integrals, Underwater sound.

Formulas were derived for the impedance of pistons on an infinite cylinder, but the integrals are so involved that no calculations have thus far been made. The purpose of this analysis is to present such calculations as well as results for mutual impedance of rings and strips on a cylindrical baffle. Although the actual baffles are finite it is hoped that the results for an infinite baffle will be close enough for an engineering approximation. (Author)

AD-286 354 Div. 30
(TISTM/ODN) OTS price $1.10

California U., La Jolla.
NEW LABORATORY FOR THE STUDY OF MATERIALS,
by Bernd T. Matthias. Apr 62, 7p. 4 refs.
(Contract AF 49(638)1040)
(AFOSR-2571) Unclassified report

DESCRIPTORS: *Laboratories, *Physics, Solids, Superconductivity, Ferromagnetism, Ferroelectricity, Alloys, Intermetallic compounds, Indium alloys, Mercury alloys.

A laboratory for the study of cooperative phenomena in solids (superconductivity, ferromagnetism, ferroelectricity) was established, equipped and staffed. A number of active research programs are underway, and the scientific results of one of these (superconductivity in the Hg-In system) are summarized. (Author)

AD-286 360 Div. 30, 12
(TISTW/PCR) OTS price $1.60

Inter-Range Instrumentation Group, White Sands Missile Range, N. Mex.
INTERIM STANDARDS FOR DIGITAL MAGNETIC TAPES FOR EXCHANGE BETWEEN RANGES.
Aug 62, 13p. 5 refs. (IRIG Document no. 102-62)
Unclassified report

DESCRIPTORS: *Magnetic tape, *Test facilities, Digital computers, Standards, Guided missile research.

At every range, the general approach to generating digital magnetic tapes is as follows: (1) digital magnetic tapes in the field are made with special recording rates, different modes of recording (NRZ or RZ), different data block lengths, etc., depending upon the type of instrumentation that is producing the data, i.e. a digital recording of a radar sampling, at 100 samples/second would differ from a digital recording of a camera mount digitizer sampling at 10 samples/second; and (2) because of these variations in formats which may exist in a single range, some form of buffer or translator device is usually provided to either buffer the field data directly in the data processing computer, or translate the field data recording to another digital magnetic tape which is compatible with a data processing computer. From the above, it can be seen that regardless of the method of recording digital data in the field, there is a method of producing computer compatible tapes. (Author)

AD-286 495 Div. 30, 16
(TISTB/LMH) OTS price $16.50

Quartermaster Research and Engineering Command, Natick, Mass.
CLASSIFICATION AND CODING SYSTEM FOR COMPILATIONS FROM THE WORLD LITERATURE ON INSECTS AND OTHER ARTHROPODS THAT AFFECT THE HEALTH AND COMFORT OF MAN,
by B. V. Travis, Herbert H. Caswell, Jr. and others. Aug 62, 251p. incl. illus. tables.
(Technical rept. no. ES-4)
(In cooperation with Cornell U., Ithaca, N. Y.)
Unclassified report

DESCRIPTORS: *Scientific reports, *Indexes, *Insects, Insect control, Public health, Geography, Military operations, Punched card methods, Data, Coding, Classification.

A system of classifying and coding entomological information from the world literature on arthropods which affect the health and comfort of man onto punch cards was developed to provide a method for readily recovering this information for immediate use. More than 700 journals and other scientific publications from which data for coding may be drawn are listed. Titles are arranged alphabetically and are numbered for entry on punch cards, which also indicate the author and date of publication. A geographic code for the world listing major administrative subdivisions for most countries, indicates the geographical areas for recording entomological data on punch cards. A world map is inclosed to aid in the identification of the major geographical entries. The classification for subject matter contains 9 categories of information for which space is assigned on the cards. Included are designations for genus, species, geographical range, seasonal activity, breeding habitat, and disease relationships. (Author)

Division 30 - RESEARCH AND RESEARCH EQUIPMENT

AD-286 569 Div. 30, 8
(TISTP/TL) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
METHODS FOR IMPROVING THE INTERFERENCE RESISTANCE OF DIGITAL SYSTEMS OF AUTOMATIC CONTROL.
by Yu. M. Korshunov. 30 Aug 62, 13p. incl. illus. 3 refs. (Trans. no. FTD-TT-62-1108 from Izvestiya Vysshikh Uchebnykh Zavedeniy, Priborostroyeniye 4:5, pp. 76-83, 1961)
Unclassified report

DESCRIPTORS: *Control systems, *Digital systems, *Signals, *Interference, Automatic, Statistical distribution, Probability, Errors, Synthesis.

On the basis of an analysis of the action of interferences in digital systems there are discussed various methods of detecting distortions and the restoration of the input signal. A scheme is proposed based on the predicted future values of the signal. A method is considered for compensating the errors brought about by retarding the signal in its transmission and conversion. (Author)

AD-286 591 Div. 30
(TISTP/FR) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ELECTRIC-ARC PREHEATERS FOR FORMATION OF HIGH-TEMPERATURE JETS,
by A. G. Shashkov, O. I. Yas'ko and others. 18 Sep 62, 27p. incl. illus. table, 51 refs. (Trans. no. FTD-TT-62-1092 from Inzhenerno-Fizicheskiy Zhurnal, 5:1, pp. 115-129, 1962)
Unclassified report

DESCRIPTORS: *Electric arcs, Plasma jets.

Methods of raising arc temperature, specifications set forth for electric-arc preheaters, schematic diagrams of the apparatus existing at the present time (according to literature data), factors limiting elevation of the jet parameters, problems of plasma contamination and electrode attrition, and methods of determining the parameters of electric-arc preheaters are given. (Author)

AD-286 594 Div. 30, 23
(TISTE/JBM) OTS price $5.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
COMPUTING DEVICES AND FOLLOW-UP SYSTEMS (Schetno-Reshayushchiye Ustroystva I Sledyashchiye Sistemy),
by N. T. Rozorenov. 18 Sep 62, 57p. incl. illus. tables (Trans. no. FTD-TT-62-1074 from Voyennoye Izdatel'stvo Ministerstva Oborony SSSR, 1961)
Unclassified report

DESCRIPTORS: *Instruction manuals, *Analog computers, *Military personnel, Translations, USSR, Officer personnel, Potentiometers, Transformers, Electric tachometers, Amplifiers, Integrator, Electronic circuits, Feedback amplifiers, Training, Business machine operators.

A description is given of design and operational principles of electrical analog devices and the follow-up systems used in conjunction with them. Attention is devoted to the physical essence of the processes that take place in the computers, with the object of assisting officers, noncommissioned officers and soldiers to acquire skill in working with computers and instruments in which they are employed, and to service them properly. (Author)

AD-286 604 Div. 30
(TISTB/LMH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A MACHINE THAT READS.
28 Aug 62, 2p. (Trans. no. FTD-TT-62-1205 from Pravda Ukrainy, Col. 1, p. 3, 12 June 62)
Unclassified report

DESCRIPTORS: *Reading machines, *Correlation techniques, Computers, Automatic, Communication equipment, Effectiveness, USSR.

AD-286 612 Div. 30, 1
(TISTW/RD) OTS price $12.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DESIGN OF ELECTRICAL MEASUREMENT DEVICES AND SYSTEMS WITH FORCE COMPENSATION (Raschet Elektricheskikh Izmeritel'nykh Ustroystv i Sistem s Silovoy Kompensatsiey),
by A. P. Yurkevich and N. Ya. Vovchenko. 17 Sep 62, 159p. incl. illus. tables, 20 refs. (Trans. no. FTD-TT-62-835 from Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo Oborongiz Moskva, 1961)
Unclassified report

DESCRIPTORS: *Instrumentation, *Flight instruments, Electrical equipment, USSR, Torque. Measurement, Galvanometers, Textbooks, Aircraft.

A Russian textbook on the design of aviation instruments is discussed. It sets forth problems of calculating the static and dynamic characteristics of instruments from their structural diagrams, design of electrical measurement devices with conversion of current into torque and force, and torque pickups for electrical measurement systems with force compensation. The various sections of the book give the necessary theoretical bases for the formulas, typical procedures for the calculations for and design of instruments and pickups, and the design of their basic units. The book is intended for students in the instrument-building and automation departments of the higher educational institutions for aeronautics, for use as a study aid in routine and diplomate design assignments. Various sections may also be of interest for engineering-technical workers in the industry. (Author)

AD-286 616 Div. 30
(TISTE/CAM) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A DEVICE FOR DECODING UNEVEN BINARY CODES,
by D. A. Novik. 18 Sep 62, 5p. incl. illus. (Trans. no. FTD-TT-62-1122 from Soviet Patent no. 144240 (594836/26), 15 Mar 58)
Unclassified report

DESCRIPTORS: *Analog systems, *Coding, Sequences, Electronic circuits, Cathode ray tubes, Translations, USSR.

The device comprises a weighing function generator and an electron-ray tube with a mat whose structure corresponds to the code being used. It is distinguished by the fact that to decode signals coded by an uneven binary code, the scan generator of the tube ray is made in one plane as a cadence impulse counter, and the scan generator of the ray in a perpendicular plane is made as a counter for the units of the code combination weighed in a key type modulator by a function characteristic for a given code. The

device for resetting the readings of both counters is made in the form of an electron key which resets each output signal as it appears. The mat of the tube is made so that each code combination corresponds to one opening whose coordinates are determined by a pair of numbers describing the combination. (Author)

AD-286 623 Div. 30
(TISTP/FR) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
BOLOMETRIC DEVICES FOR STUDYING RADIATION,
by A. F. Mal'nev and L. S. Kremenchugskiy.
21 Aug 62, 2p. incl. illus. (Trans. no. FTD-TT-62-1110 from Russian Patent no. 136070, Application no. 640884/26, pp. 1-2, 12 Oct 59)
Unclassified report

DESCRIPTORS: *Bolometers, Nickel, Modulation, Mirrors.

A bolometric device for studying radiation contains two bolometric receivers connected into a bridge circuit and alternately illuminated by the radiation being studied. Both of its bolometric receivers consist of two bolometers connected into the opposing arms of the bridge; the purpose of this feature is to increase the sensitivity of the device. (Author)

AD-286 624 Div. 30
(TISTP/WH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A DEVICE FOR DISTINGUISHING NUMBERS BY ABSOLUTE VALUE,
by I. N. Bukreyev, V. V. Chavchznidze and others.
18 Sep 62, 4p. incl. illus. (Trans. no. FTD-TT-62-1123 from Soviet Patent no. 139150 (660616/26), 29 Mar 60)
Unclassified report

DESCRIPTORS: *Digital computers, *Circuits, *Coding, USSR.

A proposed device for distinguishing numbers by absolute value differs from known devices in that a line of determination of the absolute value is used which consists of a sequence of series-connected coincidence circuits and collector circuits corresponding to a given digit. One of the inputs of each collector circuit is connected to the output of a coincidence circuit of a given digit, while the second input is connected to the output of the '01' circuit of the summator. The first input of the coincidence circuit is connected to the output of the collector circuit of the previous digit, and the second, to the output of the '00' or '11' collector circuit of the summator. This provides an increase in the speed of operation and ensures obtaining the result of a comparison of numbers by absolute value simultaneously with the performance of the operation. (Author)

AD-286 680 Div. 30, 15
(TISTB/AW) OTS price $33.50

Army Research Office, Durham, N. C.
PROCEEDINGS OF THE SEVENTH CONFERENCE ON THE DESIGN OF EXPERIMENTS IN ARMY RESEARCH DEVELOPMENT AND TESTING. SPONSORED BY THE ARMY MATHEMATICS STEERING COMMITTEE CONDUCTED AT U. S. ARMY SIGNAL RESEARCH AND DEVELOPMENT LABORATORY, FORT MONMOUTH, NEW JERSEY, 18-20 OCTOBER 1961.
Aug 62, 351p. incl. illus. tables, refs. (Rept. no. ARODR 62-2)
Unclassified report

DESCRIPTORS: *Conferences, *Military research, *Mathematics, *Applied mathematics, *Test methods, Series, Statistical analysis, Numerical methods and procedures, Factor analysis, Warfare, Games theory, Radiation effects, Electron tubes, Subminiature electron equipment, Reliability, Probability, Military aircraft, Vulnerability, Textiles, Diseases, Viruses, Simulation, Spores, Statistical data, Errors, Targets, Radar tracking.

AD-286 646 Div. 30, 25
(TISTP/WH) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
THE DESIGN AND CONSTRUCTION OF THE AOMC 8,000-kw PLASMA FACILITY.
by J. J. Ehrlich, J. F. Perkins and others. 1962, 14p. incl. illus. tables, 5 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Plasma physics, *High temperature research, *Test facilities, *Hypersonics, *Gas flow.

Complete design considerations for the AOMC 8,000-kw plasma facility are reviewed. Both facility requirements and performance characteristics are discussed for typical minimum energy ICBM and IRBM reentry trajectories. Calculated stagnation conditions are shown to be in the realm of modern plasma arc technology. Capability of the installed electric generation system is shown to be adequate to meet requirements. (Author)

AD-286 647 Div. 30, 22
(TISTW/JRG) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
DEVELOPMENT OF REPETITIVE KILOTON THRUSTS OF MILLISECONDS DURATION FOR SIMULATING THE FIRING AND DETERMINING THE RELIABILITY OF HEAVY WEAPON COMPONENTS.
by C. W. Egan and J. P. Purtell. 1962, 10p. incl. illus. 2 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 62, at the United States Military Academy, West Point, New York.

DESCRIPTORS: *Fatigue (Mechanics), *Test equipment, *Guns, *Weapons, Test methods, Impact shock, Vibration, Shock resistance, Instrumentation, Reliability, Test facilities.

A test device for reproducing thrusts of up to approximately 2 x 10 to the 6th power lb with concurrent pressures of 50,000 psi is described. The device generates an approximate half sine pulse at rates up to 100 per minute. The principal use of the device is to determine the fatigue life of alternate breech designs and the condemnation limits of finalized designs. Estimation of the reliability of breeches from results of these tests is discussed. (Author)

AD-286 784 Div. 30
(TISTP/MS) OTS price $9.10

Lincoln Lab., Mass. Inst. of Tech., Lexington.
STATE ASSIGNMENT ALGORITHM FOR CLOCKED SEQUENTIAL MACHINES,
by M. I. Schneider. 25 May 62, 99p. incl. illus. tables, refs. (Technical rept. no. 270)
(Contract AF 19(604)7400)
(AFESD TDR 62-141) Unclassified report

DESCRIPTORS: *Sequence switches, *Programming, Circuits, Coding, Design, Computers, Memory devices.

The number of gating elements in a sequential circuit, and therefore its cost and complexity, is dependent upon the assignment of codes to the sequential-circuit memory elements. An algorithm (which has been programmed) for assigning codes to the states of a clocked sequential circuit in a manner that permits the circuit to be efficiently realized is presented. A procedure that employs the state assignment algorithm for the logical design of the control logic of fixed-program computers is proposed in which the computer control logic is organized as a sequential circuit. (Author)

AD-286 816 Div. 30, 12, 1
(TISTA/GEC) OTS price $8.60

Air Force Systems Command, Washington, D. C.
QUARTERLY INDEX AND ABSTRACTS OF TECHNICAL DOCUMENTARY REPORTS.
Quarterly rept. no. 2.
1962, 94p.
Unclassified report

DESCRIPTORS: *Bibliography, *Air force research, *Indexes, *Scientific reports, Astronautics, Biology, Auxiliary power plants, Aerodynamics, Flight testing, Telemeter systems, Chemistry, Metallurgy, Luminescent materials, Jet bombers, Jet fighters, Jet training planes, Control systems, Guided missiles, Aerodynamic configurations, Re-entry vehicles, Transport planes, Hypersonics, Rocket motors, Turbojet engines, Re-entry aerodynamics.

An abstract bulletin of technical reports of Air Force research originated by AFSC in the second quarter of 1962 is presented.

AD-286 868 Div. 30, 6, 12, 2
(TISTA/VGW) OTS price $1.10

Aerospace Corp., Los Angeles, Calif.
SPACE PHYSICS PROGRAM: NEUTRON-GAMMA RAY INSTRUMENTATION EXPERIMENT.
Semiannual technical note, 1 Jan-30 June 62,
by E. F. Martina. 31 Aug 62, 3p. illus. 2 refs.
(Rept. no. TDR-69(2260-31)TN-1)
(Contract AF 04(695)69)
(DCAS TDR 62-168) Unclassified report

DESCRIPTORS: *Lunar probes, *Gamma ray spectrometers, *Neutron spectrometers, *Neutron counters, *Gamma counters, Design, Moon, Surface properties, Radiation counters, Instrumentation.

A prototype of a neutron-gamma ray flight instrument for constituent analysis of remote bodies in space (e.g., the surface of the moon) was developed and assembled to permit optimization studies and field tests. The prototype was not intended to fully meet the problems of space environment and a particular mission. The first performance test in the laboratory indicated the device will work satisfactorily. (Author)

AD-286 891 Div. 30, 5
(TISTE/JBM) OTS price $3.60

Motorola, Inc., Scottsdale, Ariz.
EXTENSION OF ELECTRONIC EQUIPMENT LIFE PREDICTION STUDY.
Quarterly progress rept. no. 3, 15 Jan-15 June 62,
by A. T. Kneale, W. N. Simpson, and M. Esher.
15 June 62, 26p. incl. illus. (Rept. no. WP-2643-3)
(Contract DA 36-039-sc-87235)
Unclassified report

DESCRIPTORS: *Test sets, *Radio equipment, Life expectancy, Electronic equipment, Test equipment, Feasibility studies, Statistical data, Instrumentation, Tests, Temperature, Failure (Mechanics), Mathematical prediction, Radio communication systems, Vibration, Data processing systems, Data storage systems, Theory, Programming, Test methods.

An effort was made to prove the feasibility of providing field instrumentation capable of measuring the rate of degradation of performance of individual pieces of electronic equipment. The major effort was as follows: (1) check out and modify the unified test console using 100 AN/PRC-6 radio sets; (2) complete the computer program for obtaining the eigenvalues and start reducing the data taken on the AN/PRC-6 radio sets; and (3) make repetitive measurements on all the AN/PRC-6 radio sets at twenty-hour operating intervals to provide statistical data for reduction and the prediction. (Author)

31. SHIPS AND MARINE EQUIPMENT

AD-285 857 Div. 31, 25
(TISTE/CRJ) OTS price $4.60

Naval Submarine Base, New London, Conn.
AUXILIARY MACHINERY NOISE AND VIBRATION MEASUREMENTS FOR 593 CLASS SS(N)'S,
by Robert York Chapman and Chester H. Colby.
30 June 62, 32p. incl. illus. tables, 8 refs.
(Technical rept. no. 212-62)
(Proj. S-F013-11-01)
Unclassified report

DESCRIPTORS: *Submarine noise, *Submarines, *Auxiliary power plants, Vibration, Acoustics, Noise, Motion, Test equipment, Measurement, Accelerometers, Calibration, Nuclear propulsion.

'Chapman numbers' are presented for most of the auxiliary machinery aboard the Class 593 SS(N) submarines. These numbers in acceleration, velocity and displacement decibels are obtained using the General Radio 1551 Sound Level Meter, Control Box and Vibration Pickup with the probe at designated positions on the structure. The research objective was to establish acoustic and vibration levels in order to evaluate auxiliary machinery performance in the interest of the preventative maintenance program. The practical use of this GR-1551 instrument to evaluate the rotational balance of resiliently mounted machine is also described. (Author)

AD-285 955 Div. 31
(TISTE/CAM) OTS price $3.60

Army Transportation Board, Fort Eustis, Va.
PNEUMATIC FENDERS.

Report of evaluation.
Sep 62, 37p. incl. illus. (Rept. no. TCB-61-038-ST)
Unclassified report

DESCRIPTORS: *Amphibious vehicles, *Landing craft, Pneumatic devices, Ships, Piers, Impact shock, Test methods.

Pneumatic Fenders were installed on the FS-313 (Freight and Supply Vessel), BD-2587 (100 ton crane), LCU-1579, LCM-6238, BARC-1-X, LARC-5-2X and LARC-15-2X and service tested for 12 months alongside vessels, piers, fixed terminals and barges in varying sea conditions. The pneumatic fenders were found to have a greater shock absorbing ability, to be much easier on painted surfaces and do not deteriorate nearly as fast as the rope, canvas covered or sponge rubber fenders. In addition the fenders do not absorb or show any apparent effect from water, oil or grease. The fenders and balance of suspension rigging were found to be satisfactory and deterioration from abuse was very slight. Pneumatic fenders evaluated are capable of protecting amphibian, landing craft and other TC vessels from damage while alongside vessels, piers, fixed terminals and barges in varying sea conditions. (Author)

AD-286 091 Div. 31
(TISTE/CAM) OTS prive $2.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
ANALYSIS OF CRITICAL MOTIONS OF A FLOATING PLATFORM.
Final rept.,
by J. J. Leendertse. 27 Aug 62, 33p. incl. illus. 11 refs. (Technical rept. no. R187)
(Proj. Y-R011-01-027)
Unclassified report

DESCRIPTORS: *Barges, *Floats, Motion, Roll, Analysis, Theory, Ocean waves, Instrumentation, Measurement.

Theoretical calculations and experimental measurements were made to determine the response in heave in the significant frequency range of 3 to 4 seconds of the CUSS 1, an ocean-bottom drilling barge to be used in experimental trials prior to Project MOHOLE. Roll was measured also. Calculations on the basis of a linear response of the barge in heave to a fully developed sea indicated that the amplitude of the response is insignificant at the critical period of 3-1/2 seconds, the calculated natural frequency of the drilling string. A pendulum-type roll pickup was installed on the barge with two heave pickups: One a specially designed horizontally mounted torsion-pendulum type sensitive to oscillations in heave of 3 to 4 seconds, and the other a gimbal-mounted conventional accelerometer. The output of both pickups was fed into a specially designed resonance amplifier. Approximately 20 minutes of pertinent barge motion measurements were made during two cruises while the barge drifted. No measurements of water-level variation were made. It was found that in seas, estimated as from 2 to 3 feet in height and with significant periods of 3 to 5 seconds as generated by winds of about 20 knots, the roll of the barge did not exceed three degrees and that its average heave at periods of from 3 to 4 seconds was about 1/4 inch. The spectral density of the heave at a period of 3.4 seconds was about 1/8 inch squared per radians per second. (Author)

AD-286 895 Div. 31, 25
(TISTP/WH) OTS price $1.60

David Taylor Model Basin, Washington, D. C.
EXPLORATORY TESTS OF LONG GLASS CYLINDERS UNDER EXTERNAL HYDROSTATIC PRESSURE,
by Martin A. Krenzke. Aug 62, 15p. incl. illus. tables, 8 refs. (Rept. no. 1641)
Unclassified report

DESCRIPTORS: *Submarine hulls, *Hydrostatic pressure, *Glass, *Elasticity, *Load distribution, Cylindrical bodies, Structural shells.

The potential of glass as a hull material for hydrospace vehicles was investigated by determining the hydrostatic strength of 20 long cylinders of No. 7740 glass. The experimental collapse pressures, which ranged between 2000 and 15,000 psi, were in excellent agreement with classical theory for elastic buckling of long cylinders. Calculations were based on minimum measured thicknesses. Although all failures appeared to initiate in the elastic buckling range, maximum circumferential stresses of about 100,000 psi were reached. This high strength coupled with a relatively low weight makes glass appear very attractive for some deep-depth applications. Although these tests were conducted on long unstiffened cylinders, calculations indicate that glass spheres have a potential of demonstrating higher strength-to-weight ratios than is attainable by any other type hull using currently available materials. (Author)

AD-286 658 Div. 31
(TISTE/JBM) OTS price $1.60

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
SURFACING SUBMARINE THROUGH ICE,
by A. Assur. 1962, 10p. 8 refs.
Unclassified report

Paper presented at the 1962 Army Science Conference, 20-22 June 1962, at the United Sates Military Academy, West Point, New York.

DESCRIPTORS: *Submarines, *Ice, Hydrodynamics, Low temperature research, Arctic regions, Theory, Mathematical analysis, Naval vessels, Thickness, Stresses, Navigation.

A theoretical analysis is presented of the problem of surfacing a submarine through ice. Two criteria are derived, one for the condition when a submarine cannot possibly surface. This is when the buoyancy force is just sufficient to produce a first crack in the ice sheet. The other is the condition when breakthrough can be accomplished. Breakthrough tests performed by CRREL with loads from above show the range between such criteria. Another consideration is whether the submarine applies a force topping at rest against the ice or whether it approaches the ice sheet with a vertical velocity. In the first case the force required under static loading is computed, in the second case the energy required to penetrate under impact load. Criteria are derived both from the elastic theory and for plastic failure on the basis of collapse mechanics. (Author)

32. MISCELLANEOUS ARTS AND SCIENCES

AD-285 882 Div. 32
(TISTB/AW) OTS price $1.60

System Development Corp., Santa Monica, Calif.
SIMULATION: A VEHICLE FOR FACILITATING INNOVATION AND SYSTEM DESIGN IN EDUCATION,

by Robert L. Egbert. 20 Sep 62, 18p. (Rept. no. SP-890)
Unclassified report

DESCRIPTORS: *Education, Simulation, Teaching machines.

The most critical problem in education--that there is a plethora of new knowledge and a rapidly developing technology, both of which are largely unused,--is discussed. Possible reasons for this lack of acceptance and use are suggested and a partial solution, simulation is advanced. A discussion of simulation is given and possible uses in education are described. Cautions to be observed in applying simulation to education are mentioned. Suggestions for simulating an elementary school are given. The school would have students both as individuals and in groups, and it would possess a curriculum through which the students would progress. Such a model would make possible the study of new organizational designs. (Author)

AD-285 884 Div. 32
(TISTB/AW) OTS price $1.60

System Development Corp., Santa Monica, Calif.
A PHONEMIC ANALYSIS PROGRAM PREPARATORY TO READING,
by Seymour Chatman. 21 Aug 62, 15p. (Rept. no. SP-936)
Unclassified report

DESCRIPTORS: *Learning, *Education, *Language, *Reading, Verbal behavior, Children, Rearing, Vocabulary, Analysis, Speech.

Reading instruction may be improved by recognizing the existence of a step preliminary to associating visual symbols with sould units. A possible method is sketched for teaching children how to break words up orally into their sound-parts, and the relation between phoneme recognition and traditional alphabet names for letters is discussed. The steps by which children learn language are described by way of introduction. (Author)

AD-285 997 Div. 32
(TISTP/WH) OTS price $2.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
A LIMIT THEOREM ON THE CORE OF AN ECONOMY,
by Gerard Debreu and Herbert Scarf. 25 July 62, 20p. incl. illus. 12 refs. (Technical rept. no. 32)
(Contract Nonr-22528, Proj. NR 047-019)
Unclassified report

DESCRIPTORS: *Commerce, *Games theory, *Inequalities, *Consumption, *Economics, Applied mathematics.

AD-286 021 Div. 32
(TISTB/LH) OTS price $1.60

RAND Corp., Santa Monica, Calif.
THE SOVIET CLASSIFICATION SCHEME FOR LITERATURE
by F. J. Krieger. Sep 62, 12p. (Memo. no. RM-3325-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Scientific reports, USSR, Literature, Classification.

AD-286 263 Div. 32, 2
(TISTP/GRW) OTS price $1.60

Forest Products Lab., Madison, Wis.
SPECIFIC GRAVITY VARIATION IN MISSISSIPPI PINES,
by P. R. Wheeler and H. L. Mitchell. July 62, 10p. incl. illus. tables, 6 refs. (Rept. no. 2250)
Unclassified report

DESCRIPTORS: *Trees, Sampling, Mississippi, Density.

A systematic increment core sampling of the pine population of Mississippi, taken in connection with the third Forest Survey of that State, provided information on the pattern of geographic variation in specific gravity, and on some of the factors that affect specific gravity. There is a broadly diagonal trend of increasing specific gravity from northwest to southeast that is correlated with warm-season rainfall. Of the other factors studied, the reciprocal of age has the most significant effect on specific gravity. Next in order of significance above the 5% level are: Age, diameter, volume, diameter/age, and basal area. (Author)

AD-286 361 Div. 32, 30
(TISTP/WH) OTS price $1.60

Inter-Range Instrumentation Group, White Sands Missile Range, N. Mex.
INDEX SYSTEM FOR IRIG DATA REDUCTION PROGRAM EXCHANGE,
Sep 62, 10p. (IRIG Document no. 105-62)
Unclassified report

DESCRIPTORS: *Indexes, *Test facilities, *Data processing systems, *Instrumentation.

AD-286 511 Div. 32, 17, 14
(TISTM/TCG) OTS price $7.60

Battelle Memorial Inst., Columbus, Ohio.
DEFENSE METALS INFORMATION CENTER SELECTED ACCESSIONS,
comp. by Patricia B. Plate. Sep 62, 54p.
(Contract AF 33(616)7747, Proj. 2(8-8975)
Unclassified report

DESCRIPTORS: *Metals, *Heat resistant alloys, *Refractory materials, *Coatings, *Documentation, *Scientific reports, *Abstracting, Cobalt alloys, Nickel alloys, Steel, Stainless steel, Iron alloys, Beryllium, Titanium, Magnesium, Niobium, Graphite, Chromium, Molybdenum, Tantalum, Vanadium, Tungsten, Platinum.

AD-286 563 Div. 32
(TISTB/AW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
BUSINESSMEN FROM SCIENCE AND THEIR PATRONS,
by G. Petrov. 29 Aug 62, 10p. (Trans. no. FTD-TT-62-1120 from Pravda 4p. 23 May 62)
Unclassified report

DESCRIPTORS: *Scientific personnel, *USSR, Scientific reports, Textbooks, Errors, Communism, Education.

A system of determining the qualifications of scientific workers by means of awarding them scientific degrees and titles from scientific councils of institutes with subsequent approval of the Higher Certification Commission (VAK) exists which conveniently permits the organization of training and conducts the registration of scientific guidance cadres. This system provides an entrance into science for everyone possessing the ability, and objectively permits an evaluation of the qualifications of the candidates for the corresponding title and degree. Manuscripts of

books, particularly textbooks, also go through repeated reviewing, and are discussed by the scientific councils of those institutions from the name of which they are published, by expert commissions, etc. Strange facts are often encountered in these books. They indicate that all scientists do not always render an account concerning the consequences to which indulgence and unrestraint can be applied in the evaluation of books, dissertations and other works. Several examples from the field of hydrodynamics are cited. (Author)

AD-286 593 Div. 32
(TISTB/MD) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PHOTOSYNTHESIS AND THE PROBLEM OF FOOD RESOURCES,
by A. A. Nichiporovich. 12 Sep 62, 21p. incl. illus. tables (Trans. no. FTD-TT-62-533 from Vestnik Akademii Nauk SSR, No. 11, pp. 47-58, 1961)

Unclassified report

DESCRIPTORS: *Agriculture, *Photosynthesis, Effectiveness, Solar energy, Water supplies, Plants, Algae, Animals, Russia, Food.

A closed system with heat regulation, water conservation, soilless culture, careful selection of most efficient plants, complete utilization of all parts of plants and of human and animal waste is proposed as a solution to the problem of food resources for an expanding population.

AD-286 729 Div. 32
(TISTB/AW) OTS price $1.10

System Development Corp., Santa Monica, Calif.
FLES--A NEW APPROACH,
by Gerald Newmark. 27 Sep 62, 3p. (Rept. no. SP-971)

Unclassified report

DESCRIPTORS: *Language, *Education, *Teaching machines, Effectiveness, Hearing, Training.

A listening comprehension approach is proposed for teaching foreign languages in elementary schools (FLES), especially where qualified language instructors are not available. Programmed materials for listening comprehension in French are described. The organization of interstate committees or a national committee of experts to avoid duplication in the production of FLES material is recommended. (Author)

AD-286 792 Div. 32
(TISTB/LMH) OTS price $7.60

RAND Corp., Santa Monica, Calif.
A SELECTED LIST OF UNCLASSIFIED PUBLICATIONS OF THE SOCIAL SCIENCE DEPARTMENT - THE RAND CORPORATION 1948-1962,
Oct 62, 69p. (Memo. RM-1403-10)

Unclassified report

DESCRIPTORS: *Social sciences, *Bibliography, Scientific reports, Foreign policy, Civilian defense systems, Political science, Propaganda, Communism, Military operations, Psychological warfare, Stress (Psychology), Psychology, USSR, Religion.

33. TRANSPORTATION

AD-285 821 Div. 33
(TISTA/GEC) OTS price $1.25

National Aviation Facilities Experimental Center, Atlantic City, N. J.
INVESTIGATION OF DRILL TESTING FOR PANCAKE LIGHTS.
Final rept.,
by C. B. Phillips and N. H. Twichell. Mar 62, 39p. incl. illus.

Unclassified report

DESCRIPTORS: *Runway lights, *Earth augers, *Drilling machines, Drills, Tests, Construction.

The results are reported of operational testing of a number of drills and drill rigs which were performed in order to determine the most satisfacory equipment available for producing the recesses required for the installation of an inset type light. The drills and drill rigs tested were used primarily for installation of inset lights in the first 3000 ft of a runway. This section of runway consisted of 2000 ft of concrete pavement constructed 2 1/2 yrs ago, in which an aggregate of medium hardness was used and 1000 ft of concrete pavement constructed 20 yrs ago and containing a very hard aggregate. Segmented core drills were recommended for cutting recesses for inset lighting fixture installations. Continued development of drills was recommended since the segmented core drill requires considerable hand labor to remove the material in the kerfed area. Recommendations are also included concerning the features of a drill rig which should be employed in order to prepare recesses with a minimum of time and effort. (Author)

AD-286 486 Div. 33
(TISTA/VGW) OTS price $6.60

National Aviation Facilities Experimental Center, Atlantic City, N. J.
TEST AND EVALUATION OF REMINGTON RAND UNIVAC HIGH-SPEED PRINTER.
Final rept.,
by G. Apostolakis and C. Chapman. Sep 61, 66p. incl. illus. tables, 6 refs.

Unclassified report

DESCRIPTORS: *Air traffic control systems, *Typewriters, Printing, Design, Effectiveness, Computers, Flight paths, Data processing systems.

The results are presented of technical and operational tests of high-speed printer designed to print flight progress strips in two colors and two print sizes. Technical difficulties encountered are detailed and suggestions for modifications to improve certain technical features are advanced. Also, recommendations are made for improvement of some operational features of this printer. Capacity tests were conducted comparing the flight progress printing rate for this printer with that of six inquiry typewriters. The high-speed printer can print flight progress strips significantly faster than the UNIVAC Model 1 File Computer can process the flight progress strip information and more rapidly than six inquiry typewriters. This printer is recommended as a replacement for the inquiry typewriters after improvements to remove the technical and operational limitations detailed in the final report. (Author)

Division 33 - TRANSPORTATION

AD-286 695 Div. 33
(TISTA/GEC) OTS price $2.60

Air Weather Service, Scott Air Force Base, Ill.
ESTIMATING THE PROBABILITY OF OPERATIONALLY-CRITICAL WIND SPEEDS AFFECTING AN AIR BASE DURING THE PASSAGE OF A TROPICAL CYCLONE,
by H. S. Appleman. Aug 62, 22p. incl. illus. tables, 6 refs. (Technical rept. no. 164)
Unclassified report

DESCRIPTORS: *Airports, *Tropical cyclones, Climatic factors, Wind, Velocity, Air Force operations, Interference, Probability, Weathe. forecasting, Statistical analysis, Operation.

A forecast of a tropical cyclone to pass in the vicinity of a base requires certain decisions to be made, such as whether to tie down or evacuate aircraft, delay construction projects, remove missiles from firing pads, etc. A decision to take such protective action is based primarily on the expectancy of occurrence of wind speeds above a critical value considered hazardous to that particular installation. In order to balance the cost of protection against the damage incurred by an unprotected base, the commander must know the probability of his installation being struck by above-critical wind speeds during the passage of the storm. In June 1958, Air Weather Service published a technical report (AD 218 559) which outlined a method for computing the total probability of above-critical wind speeds affecting an airbase at some time during the passage of a hurricane or typhoon. A technique was developed for obtaining the instantaneous probability of strong winds affecting a base at each hour during the storm's passage, and a somewhat different approach was used to obtain the hour-by-hour instantaneous probability. Since an estimate of both the total and hourly probabilities of a base being affected by above-critical winds would be of value to the various activities on the base, some features from each of the three previous studies, plus certain new techniques were used to provide a more consistent solution to the entire problem. (Author)

AD-286 887 Div. 33
(TISTA/GEC) OTS price $4.60

Coordinated Science Lab., U. of Illinois, Urbana.
AUTOMATIC AIR TRAFFIC CONTROL. PART I. A PROJECTED SYSTEM,
by L. S. Kypta. Aug 62, 39p. illus. (Rept. no. R-145)
(Contract DA 36-039-sc-85122)
Unclassified report

DESCRIPTORS: *Air traffic control systems, Automatic, Control, Tracking, Flight paths, Communication systems, Display systems, Computers, Data processing systems, Landing, Take-off, Design, Air traffic, Data storage systems, Memory devices, Decision making.

The automatic air traffic control system described consists of automatic control centers for en route control and small satellite computers for approach-departure control. Each automatic control center is composed of 5 automatic sections providing the following functions: position gathering and tracking, internal communication, manual input and display, control, and information storage. An automatic center is capable of controlling over 1000 aircraft simultaneously. Each satellite computer is intended to control approaching and departing aircraft for one airport and is capable of controlling 50 flights simultaneously. The goal in the design of the system is to provide a system that in no way hinders traffic flow and also is safe and simple to use. To achieve this goal, it is necessary to automate all processes in which information flows in large quantities or is rapidly changing. The most important process falling in this category is decision making; consequently, decision making has been automated. All processes in which information is slowly changing or infrequently exchanged are to be executed manually. (Author)

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

* Descriptors marked with an asterisk are included in the subject index.

BIBLIOGRAPHY

SCR-500 $1.75

Sandia Corp., Albuquerque, N. Mex.
CIVILIAN APPLICATION RELEASES THROUGH 1961. Bibliography. June 62, 69p.

AGRICULTURE

TID-15972 $1.60

Rutgers U., Newark, N. J.
A STUDY OF STRONTIUM, CALCIUM, AND BARIUM RELATIONSHIPS IN SOILS AND VEGETATION, by J. C. F. Tedrow. Progress rept. on Contract AT(30-1)-2494. [1962] 11p.

AD-281 287 $1.10

Civil Aeromedical Research Inst., Oklahoma City, Okla.
TOXIC HAZARDS IN AERIAL APPLICATION, by Paul W. Smith. Apr 62, 10p. 11 refs. Rept. no. 62-8.

DESCRIPTORS: *Insecticides, Airborne, *Pest control, Hazards, Handling, Toxicity, Agriculture.

An analysis of the hazards accompanying the aerial application of toxic pest-control chemicals is presented. The nature of the chemicals, the symptoms of toxicity, recommended treatment, and suggestions for safe-handling, are discussed. (Author)

Astrophysics

NASA N62-16000 $14.50

Geophysics Corp. of America, Bedford, Mass.
PLANETARY ATMOSPHERE STUDIES VIII: LABORATORY AND THEORETICAL STUDIES IN THE VACUUM ULTRAVIOLET FOR THE INVESTIGATION OF CHEMICAL PHYSICS OF PLANETARY ATMOSPHERES, by F. F. Marmo. Final rept. on Contract NASw-124. Dec 61, 217p. GCA Technical rept. no. 61-20-N.

NASA N62-16369 $4.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THERMAL HISTORY OF THE MOON AND OF THE TERRESTRIAL PLANETS: CONVECTION IN PLANETARY INTERIORS, by Zdenek Kopal. Rept. on Contract NAS7-100. 30 Apr 62, 49p. 22 refs. Technical rept. no. 32-276.

NASA N62-16164 $1.10

Laboratory for Nuclear Science, Mass. Inst. of Tech., Cambridge.
THE LANTHANUM, EUROPIUM, AND DYSPROSIUM CONTENTS OF TWO TEKTITES, by John W. Chase, Charles C. Schnetzler and others. Rept. on Grant NsG-222-61. [1962] 7p. 3 refs.

BEHAVIORAL SCIENCES

AD-281 531 $3.60

Human Engineering Labs., Aberdeen Proving Ground, Md.
STUDIES ON THE PERCEIVED THRESHOLD FOR MOTION. I. EFFECTS OF APERTURE DIMENSION ON THRESHOLD VELOCITY, by Charles Fried and James A. Meadows. Feb 62, 34p. 34 refs. Technical memo. 6-62.

DESCRIPTORS: *Human engineering, *Visual thresholds, *Motion, Velocity, Visual perception, Mental fatigue, Test equipment.

The influence of aperture dimension on the lower threshold of motion was investigated by comparing the effects of five differently sized aperture squares on motion threshold. The effect of aperture dimension was especially apparent for the smaller dimensions employed. The theoretical implications of these results were further explored in two additional experiments intended to determine if threshold values are a function of frame of reference dimensions or distance to a reference line. It was concluded that motion threshold value is a function of the latter, if a well-defined referent is provided. (Author)

Personnel and Training

AD-279 538 $1.60

Bureau of Naval Personnel, Washington, D. C.
DEVELOPMENT OF FORMS 2 AND 3 OF THE RESERVE OFFICER SELECTION TEST, by John H. Steinemann, Bernard Rimland, and Edwin Zwerski. Jan 62, 13p. Technical Bulletin 62-2.

DESCRIPTORS: *Naval reserve, *Officer personnel, Selection, *Aptitude tests, Leadership, Statistical analysis.

The Reserve Officer Selection Test (ROST) is used to assist in the selection of enlisted reserves qualified for promotion to commissioned status. Forms 2 and 3 of the ROST consist of Verbal, Arithmetic Reasoning, Mechanical, and Naval Information subtests. The three aptitude-type subtests were developed after trial administration to an NROTC population. The content of the Naval Information subtest was developed on the basis of recommendations of a panel of naval officers and civilian professional personnel. (Author)

AD-280 137 $2.60

Bureau of Naval Personnel, Washington, D. C.
GUIDELINES FOR EVALUATING AUTOMATED INSTRUCTIONAL PROGRAMS AND DEVICES, by Francis L. Harmon. Feb 62, 26p. 12 refs. Technical Bulletin 62-4.

DESCRIPTORS: Naval research, *Naval personnel, *Teaching machines, Automation, Training devices, Education, Learning.

Some points to consider in evaluating automated instructional programs for Navy training are specified. The following factors are covered: Alleged advantages of automated instruction are reviewed, including claims of better learning, time-saving, reduced attrition, more effective use of instructors, better motivation, and individualized instruction. Characteristics of programs, including types of program, sources of supply, quality, and suitability to training needs. Characteristics of teaching machines, including manufacturers' claims of versatility, mechanical reliability, and convenience. The introduction of automated instruction, including cost, preliminary tryout, and integration with the rest of the training program. (Author)

AD-280 154 $2.60

Bureau of Naval Personnel, Washington, D. C.
EXPERIMENTAL TRAINING OF SONARMEN IN THE USE OF ELECTRONIC EQUIPMENT. I. DIAGNOSTIC TESTING OF BASIC SONAR STUDENTS, by Alvin J. Abrams. Jan 62, 26p. 4 refs. Technical Bulletin 62-1.

DESCRIPTORS: *Sonar personnel, Electronic equipment Training, Students, Test equipment, Maintenance, Achievement tests.

During the period Dec 60-Feb 61, seventy-nine sonarmen students at the Fleet ASW School, San Diego, were tested in their use of electronic test equipment. All were tested at the completion of the eight week maintenance phase of the basic sonarman course. The test was diagnostic in that it was constructed to identify the specific procedural errors which accounted for inaccurate measurements. The main conclusion of this research was that while a majority of the students mastered most of the procedural steps, few demonstrated the knowledge and experience necessary to perform over-all checks without error. It is recommended that the information contained in this report be reviewed by school administrators, and that this information be used in modifications of electronic test equipment training in the maintenance phase of the sonarman course. (Author)

AD-281 210 $7.60

Bureau of Naval Personnel, Washington, D. C.
TRAINING, UTILIZATION, AND PROFICIENCY OF NAVY ELECTRONICS TECHNICIANS. I. GENERAL CONSIDERATIONS, by Adolph V. Anderson. Mar 62, 73p. 4 refs. Technical Bulletin 62-5.

DESCRIPTORS: *Electronic equipment, *Maintenance, Naval research, *Naval personnel, Training, *Achievement tests.

The principal aim of this report is to present a detailed background against which to evaluate and interpret the results to be presented later. Random samples of 309 ET's from the Pacific Fleet and 106 ET's from the western United States commands were interviewed and tested during the period from February through June, 1961. Eight data collection instruments are described and illustrated in the appendices. Descriptive data presented for the two samples of ET's includes information on age, education, classification test scores, billet and assignment types, and training received and stated training needs. (Author)

AD-279 196 $1.60

Civil Aeromedical Research Inst., Oklahoma City, Okla.
PROBLEMS IN AIR TRAFFIC MANAGEMENT: III. IMPLICATIONS OF AGE FOR TRAINING AND JOB PERFORMANCE OF AIR TRAFFIC CONTROLLERS, by David K. Trites and Bart B. Cobb, Jr. Feb 62, 16p. Rept. no. 62-3; NASA N62-10353.

DESCRIPTORS: *Air traffic controllers, *Aviation personnel, Training, Age, Job analysis, Achievement tests, Applied psychology, Statistical analysis.

The relationships between chronological age upon entry into ATC training and school and job performance were examined in five samples of air traffic controller trainees. The data confirm conclusively the existence of an inverse relationship such that the older trainees have significantly less chance than their younger classmates of either completing training or being considered a satisfactory controller. Based upon the results of this investigation it is recommended that a maximum age limit be established for entry into ATC training. (Author) (See also AD-279 183)

Psychology

AD-279 676 $1.60

Bureau of Naval Personnel, Washington, D. C.
SELF-CONFIDENCE AND EFFECTIVE LEADERSHIP, by David Kipnis and William P. Lane. Jan 62, 15p. 8 refs. Technical Bulletin 62-3.

DESCRIPTORS: *Officer personnel, *Leadership, *Training, Naval administration, Applied psychology, Naval personnel.

This study deals with the relationship between petty officers' confidence in their leadership abilities and the kinds of techniques of supervision they use. Petty officers who lacked self-confidence more frequently placed reliance upon administrative regulations, such as placing a man on report, as well as unofficially turning their supervisory problems over to a superior. Petty officers high in self-confidence were more likely to place reliance upon face-to-face discussions with subordinates. The findings suggest a need to provide the young petty officer with training and experience in handling men and in solving supervisory problems before he is given direct leadership responsibilities. (Author)

AD-280 849 $2.60

Human Engineering Labs., Aberdeen Proving Ground, Md.
THE INFLUENCE OF MILITARY RANK OF EXPERIMENTER ON THE CONDITIONING OF A VERBAL RESPONSE, by Sam Glucksberg and Donald L. Lince. Jan 62, 24p. 10 refs. Technical memo. 10-62.

DESCRIPTORS: *Military personnel, Personnel, *Conditioned reflex, Reflexes, *Verbal behavior, Behavior, Reaction (Psychology), Effectiveness, Psychology, Analysis of variance.

The relative effectiveness of experimenters of different military ranks as sources of reinforcement was investigated in a verbal conditioning task. With all experimenter variables, other than perceived formal rank, held constant, no effects of rank were obtained. Only those subjects who were aware of the contingency between their responses and the experimenter's behavior increased their use of the reinforced response. Implications for psychological research in a military setting are discussed. (Author)

AD-281 311 $1.10

Human Sciences Research, Inc., Arlington, Va.
INTEGRATION OF SMALL GROUP RESEARCH INFORMATION: PROGRAM REPORT, by Joseph E. McGrath. Rept. on Contract AF 49(638)256. June 62, 8p.

DESCRIPTORS: *Sociology, *Group dynamics, Sociometrics, Reliability, Personnel, Behavior, Reports.

AD-279 206 $4.60

Laboratory of Aviation Psychology, Ohio State U. [Research Foundation] Columbus.
ON THE SCHEDULING OF TRAINING CONDITIONS FOR THE ACQUISITION AND TRANSFER OF PRECEPTUAL-MOTOR SKILLS, by George E. Briggs. Rept. on Contract N61339-836. 1 Dec 61, 41p. 14 refs. Technical rept. NAVTRADEVCEN 835-1.

DESCRIPTORS: Training, *Teaching machines, Scheduling, *Control systems. Human engineering, Display systems, *Transfer of training, Sensory perception, *Motor reactions, *Training devices, Learning, Feedback.

This study serves two general purposes: (a) to explore the usefulness of display aiding and augmented feedback as techniques for cuing the trainee to the important aspects of a vehicular control task, and (b) to explore schedules of change in display aiding conditions and augmented feedback so as to optimize the facilitation of skill learning.

AD-281 383 $1.60

Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.
ADJUSTMENT CRITERIA IN ANTARCTICA, by E. K. Eric Gunderson and Paul D. Nelson. Mar 62, 11p. 3 refs. Rept. no. 62-1.

DESCRIPTORS: *Adjustment (Psychology), Standards, Adaptation (Physiology), *Stress (Physiology), Climate, *Antarctic regions, *Behavior.

The objectives of this research are to investigate the effects of prolonged isolation and stress upon individual and group adjustment and to identify personality and demographic characteristics associated with inferior or superior adjustment in small remote closed communities such as the Antarctic stations. (Author)

AD-280 599 $1.60

Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.
CLINICIAN AGREEMENT IN ASSESSING FOR AN UNKNOWN ENVIRONMENT, by E. K. E. Gunderson and Paul D. Nelson. Apr 62, 14p. 3 refs. Rept. no. 62-4.

DESCRIPTORS: *Personnel, *Psychometrics, *Antarctic regions, *Behavior, *Adjustment (Psychology), Psychology, Psychiatry, *Adaptation (Physiology)

The results clearly indicate areas of general agreement among clinicians in approaching an ambiguous assessment task. Using largely different procedures and sources of information, that is, brief interviews oriented toward personal history versus Rorschachs, psychiatrists and psychologists as groups utilized a set of assessment dimensions in much the same way, held similar assumptions about relevant personality characteristics, and evaluated the potentially stressful attributes of the environment for which the assessment was conducted in very similar terms. These findings appear to be an important first step in understanding the frame-of-reference adopted by clinicians in assessing personnel for unknown environments. (Author)

AD-280 601 $2.60

Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.
SPONTANEOUS AUTONOMIC ACTIVITY, AUTONOMIC REACTIVITY AND ADAPTATION, by Laverne C. Johnson. Apr 62, 22p. 5 refs. Rept. no. 62-7.

DESCRIPTORS: *Autonomic nervous system, *Reaction (Psychology), *Adjustment (Psychology), Galvanic skin response, Electroencephalography, Cardiotachometers, Light, Sound, *Stimulation, Heart, Respiration.

Sixty-five Navy pilots were studied to examine: (1) the

relationship of spontaneous GSR and HR activity (response without known external stimuli) during rest to that seen during two types of stimulation recorded two days apart, (2) the reliability of non resting spontaneous activity, (3) the adaptation of spontaneous activity to repetitive stimuli; and (4) the relationship of resting spontaneous activity to general autonomic reactivity and adaptation. Spontaneous activity during a resting period was related to that seen during stimulation and this relationship was consistent from stimuli to stimuli and over time. Though labile Ss, based upon number of spontaneous GSR, seem to show more autonomic reactivity, these results do not allow one to make inferences from one autonomic variable to another nor to use a term such as general autonomic lability. (Author) (See also AD-281 294)

AD-281 294 $2.60

Navy Medical Neuropsychiatric Research Unit., San Diego, Calif.
STABILITY AND CORRELATES OF SPONTANEOUS AUTONOMIC ACTIVITY, by Laverne C. Johnson. Apr 62, 27p. 13 refs. Rept. no. 62-6.

DESCRIPTORS: Stability, Stimulation, *Reaction (Psychology), *Heart, Skin, Respiration, *Galvanic skin response, Cardiotachometers, Electroencephalography, Cerebral cortex, *Autonomic nervous system.

Stability and relationship of spontaneous GSR and HR activity, atypical fluctuations in the absence of known external stimuli, were examined using a sample of 65 helicopter pilots. Six channels of EEG plus heart rate, GSR, skin temperature, and respiration were recorded using a 12 channel Offner Type R Dynograph. Spontaneous GSR was found to be moderately stable but spontaneous HR was found to be less reliable. Spontaneous HR and GSR were independent of each other. Spontaneous HR was also not significantly correlated with heart rate, skin resistance, skin temperature, respiration, or EEG. During relaxed awake resting periods, spontaneous GSR was also independent of the other physiological variables, including basal skin resistance. Spontaneous GSR activity was found, however, to decrease during periods of lowered arousal. This increase and decrease in spontaneous GSR activity was correlated with EEG and basal skin resistance indicators of arousal. (Author)

AD-281 343 $5.60

New York U., N. Y.
PSYCHOLOGICAL STUDY OF MOTOR SKILLS: PHASE II, by Lawrence Karlin and Rudolf G. Mortimer. Rept. on Contract N61339-558. 22 Nov 61, 54p. 28 refs. Technical rept. NAVTRADEVCEN 558-2.

DESCRIPTORS: *Motor reactions, *Training devices, Learning, Stimulation, *Vision, *Hearing, Reaction (Psychology), Feedback.

The effects of augmenting feedback on a simple motor skill involving maintenance of a steady state varied with the three measures used--time within scoring tolerance, the constant error component, and the variable error component. For this task, visual and verbal-visual augmenting feedback (the "action" cues) reduced variable error in learning and retention. Verbal augmenting feedback was superior to other modes of feedback in retention for a simple motor skill and in both learning and retention for a simple compensatory tracking task. The effect of the verbal cue was to decrease constant error in the first task. (See also: PB 150 639)

BIOLOGICAL SCIENCES

NASA N62-15892 $1.60

Armour Research Foundation, Chicago, Ill.
LIFE IN EXTRATERRESTRIAL ENVIRONMENTS, by Charles A. Hagen and Ervin J. Hawrylewicz, Quarterly status rept. no. 6, 15 May-15 Aug 62, on Contract NASr-22. [1962] 14p. 4 refs. ARF-3194-6.

TID-16518 $7.60

Arizona-Sonora Desert Museum, Inc., Tucson.
ECOLOGICAL AND GENETICAL STUDIES OF EVOLUTIONARY FORCES ACTING ON DESERT POPULATIONS OF MUS MUSCULUS, by Keith E. Justice. Final rept. 1 June 59-31 May 62, on Contracts AT(11-1)-900 and AT(30-1)-1804. Aug 62, 73p. 3 refs.

TID-16508 $1.10

Rochester U. Coll. of Arts and Science, N. Y.
SOMATIC MUTATIONS IN THE MOTH EPHESTIA, by Ernst W. Caspari. Progress rept. on Contract AT(30-1)-2902. 29 Aug 62, 9p.

TID-15486 $1.10

Wisconsin U., Madison.
POPULATION GENETICS OF MAN AND DROSOPHILA, by Newton E. Morton. Final rept. on Contract AT(11-1)-827. [1962] 5p.

Anatomy and Physiology

BNL-4976 $1.10

Brookhaven National Lab., Upton, N. Y.
PERSISTENCE IN ERYTHROCYTE GHOSTS OF MEDIATED SUGAR TRANSPORT, by Paul G. LeFevre. [1958] 8p. 10 refs.

AD-280 610 $1.60

Civil Aeromedical Research Inst., Oklahoma City, Okla.
HUMAN TOLERANCES, by Bruno Balke. Apr 62, 17p. 14 refs. Rept. no. 62-6; NASA N62-12018.

DESCRIPTORS: Supersonic flight, Manned, *Space flight, Physiology, *Stress (Physiology), *Adaptation (Physiology), Adjustment (Psychology), *Acceleration tolerance, *Astronauts, *Aviation personnel, Heat tolerance, *Aviation medicine.

The ultimate limitations in flight performance and in future civil air carrier equipment are the limitations imposed by what may be termed "human tolerances." This is particularly applicable to the matter of the supersonic transport. The discussion of man's maximum adaptive capacities for the majority of stresses potentially encountered in atmospheric and transatmospheric flights points to the weakest links in the man-machine complex of air and space transportation. An attempt is made to point out the means by which the human tolerances can be maximally adapted to the advanced technology. (Author)

NASA N62-16285 $2.60

Northrop Space Labs., Hawthorne, Calif.
BIOLOGICAL AND PHYSIOLOGICAL STUDIES OF PEROGNATHUS (POCKET MICE) by R. G. Lindberg, Robert M. Chew, and J. J. Gambino. Quarterly status rept. no. 2, 1 June-31 Aug 62, on Contract NASr-91. [1962] 23p. 17 refs. Document no. NSL 62-125-1.

TID-16012 $2.60

Washington U., St. Louis, Mo.
SUMMARY OF INVESTIGATIVE WORK WITH OXYGEN 15 [AS A BIOLOGICAL TRANSFER] by M. Ter-Pogossian. Progress rept., 1 June 59-30 Nov 61, on Contract AT(11-1)-782. [1961] 22p.

Biochemistry

TID-16009 $5.60

Kansas U., Lawrence.
AN EXPERIMENTAL INVESTIGATION OF THE EFFECT OF SEVERAL SOLVENTS ON THE CHROMATOGRAPHIC SEPARATION OF IODINATED THYROID PRODUCTS IN HUMAN URINE, by Calvin Davis Jackson. Master's thesis. May 60, 52p.

TID-157?2 $1.10

Wistar Inst. of Anatomy and Biology, Philadelphia, Pa.
ON THE ISOLATION OF INFECTIOUS RIBONUCLEIC ACID FROM ENCEPHALOMYOCARDITIS AND MENGO ENCEPHALITIS VIRUSES. THE EFFECT OF SODIUM DEOXYCHOLATE, by J. S. Colter, Ruth A. Casper, and K.A.O. Ellem. Rept. on Contract AT(30-1)-2566. [1961] 10p. 22 refs.

TID-16113- $1.10

Worcester Foundation for Experimental Biology, Shrewsbury, Mass.
STUDIES ON BIOLOGICALLY ACTIVE AMINES, by Yutaka Kobayashi. Annual progress rept. 1 Oct 61-15 June 62, on Contract AT(30-1)-2085. 25 June 62, 10p

Medical Specialties and Equipment

AD-281 262 $1.10

Naval Missile Benter, Point Mugu, Calif.
AN IMPROVED PHYSIOLOGIC ELECTRODE, by G. G. Lucchina and C. G. Phipps. 8 June 62, 8p. 1 ref. Technical memo. no. NMC-TM-62-18.

DESCRIPTORS: *Electrocardiography, *Electrodes, Skin, *Gels, *Silver electrodes, Silver compounds, Chlorides, *Medical equipment, Vectorcardiography.

A physiological electrode is presented which is fabricated by compressing a finely ground mixture of silver and silver chloride under 20,000 psi. Desirable characteristics displayed by this electrode are low lead DC potentials and lead resistance readings which are stable for at least 12 hours. When compared to a calomel reference electrode, a DC potential of only +0.6 millivolt was generated. (Author)

AD-279 923 $1.60

Naval Missile Center, Point Mugu, Calif.
LEAD PLACEMENT FOR DYNAMIC ELECTROCARDIOGRAM USING COMPARATIVE VECTORGRAM METHOD by G. F. Kelly and C. G. Phipps. 2 Mar 62, 14p. 5 refs. Technical memo. no. NMC-TM-62-3.

DESCRIPTORS: *Electrocardiography, Dynamics, *Vectorcardiography, *Medical equipment, Noise, Inhibition, Muscles, Bioelectronics.

A physiologic electrode and a new system of electrode placement are described which enable useful electrocardiograms to be recorded in a dynamic state and in a form quite similar to conventional tracings. The advantages of this system are as follows: (1) The electrode type overcomes pressure artifacts and noise. (2) The system of electrode placement is on the torso and remote from muscle masses with the result that muscle potential interference is minimized. (3) Tracings correspond closely to standard limb lead I, augmented lead aVF and unipolar lead V_2, therefore, interpretation via the spatial vector method does not require new criteria and familiarization by an evaluator. (Author)

AD-280 447 $1.60

Naval Missile Center, Point Mugu, Calif.
AN ORTHOGONAL LEAD SYSTEM AND ELECTRODE DESIGN FOR A DYNAMIC ELECTROCARDIOGRAM, by G. G. Lucchina and C. G. Phipps. 25 Apr 62, 18p. 5 refs. Technical memo. no. NMC-TM-62-10.

DESCRIPTORS: Vectorcardiography, Dynamics, *Electrodes, Skin, Muscles, *Silver electrodes, Silver compounds, Chlorides, *Gels, *Electrocardiography, *Medical equipment.

A three-dimensional lead system using nonstandard lead positions and electrodes to monitor subjects in a dynamic state is described. This lead system has been successfully used for over one year to record electrocardiograms of personnel flying in high-performance aircraft. The lead system is simple, accurate, readily

applied, yields a trace relatively free of muscle artifacts, and employs a common terminal which provides a reference point for unipolar recording nearly indistinguishable from the Wilson common terminal. The electrodes used in this system minimize pressure and contact potential artifacts. It is suggested that this system may also be used to record longterm dynamic electrocardiograms in cardiac and other critically ill patients as well as for a research tool. (Author)

Radiobiology

BNL-4986 $1.60

Brookhaven National Lab., Upton, N. Y.
THE AGING CELLULAR PHASE OF THE SKELETAL SYSTEM STUDIED WITH H^3-THYMIDINE (H^3TDR), by Edgar A. Tonna and Eugene P. Cronkite. [1960] 20p. 17 refs.

NASA N62-15218 $1.60

Committee on Space Research (COSPAR), The Hague (Netherlands).
THE BIOLOGICAL EFFECTS OF HEAVY COSMIC RAY PARTICLES, by H. J. Curtis (Brookhaven National Lab.) [1962] 21p. 7 refs. BNL-6098.

Presented at Third International Space Science Symposium and Fifth COSPAR Plenary Meeting, Washington, 30 Apr-9 May 62.

TID-15980 $1.10

Jefferson Medical Coll., Philadelphia, Pa.
FRACTIONATION OF THE CELLULAR ELEMENTS OF BONE MARROW AND OTHER HEMATOPOETIC TISSUES IN AN ATTEMPT TO AVOID HOMOLOGOUS DISEASE AND AID THE ACCEPTANCE OF HOMOLOGOUS DISEASE AND AID THE ACCEPTANCE OF HOMOLOGOUS TISSUE GRAFTS. Progress rept. on Contract AT(30-1)-2862. 25 Aug 62, 8p.

TID-15984 $1.10

Michigan U., Ann Arbor.
ELEVATION OF LD_{50} LEVEL IN DECAPITATED PLANARIA, by James V. McConnell, Margaret L. Clay, and Raymond B. Kauffman. Rept. on Contract AT(11-1)-825. [1961]. 7p.

TID-16051 $1.60

New York U., N. Y.
HISTOCHEMICAL AND BIOLOGICAL ALTERATIONS FOLLOWING WHOLE BODY X-IRRADIATION, by E. Kivy-Rosenberg and B. W. Zweifach. Progress rept., June 61-June 62, on Contract AT(30-1)-1680. [1962] 12p. 2 refs.

TID-16131 $1.60

Philadelphia General Hospital, Pa.
THE EFFECT OF X-RAY IRRADIATION ON THE LIPIDS OF THE SKIN, by Henry P. Schwarz. Progress rept., 1 Oct 61-30 June 62, on Contract AT(30-1)-1864. [1962] 14p. 11 refs.

TID-16577 $2.60

Wyoming U., Laramie.
EXCRETION AND RETENTION OF Se^{75} IN RELATION TO MODES OF ADMINISTRATION, TOXICITY, AND PREGNANCY, by Irene Rosenfeld. Final rept. on Contract AT(11-1)-630. 10 Sep 62, 22p. 27 refs.

CHEMISTRY

NYO-9837 $1.10

Rutgers U., New Brunswick, N. J.
POLAR-NONPOLAR OR AMPHIPATHIC INORGANIC COMPOUNDS, by U. P. Strauss. Progress rept. on Contract AT(30-1)-1018. [1962]. 6p.

Order from GPO $5.75 as
C 13.44:43/v. 1

National Bureau of Standards, Washington, D. C.
CHEMISTRY OF CEMENT. PROCEEDINGS OF THE INTERNATIONAL SYMPOSIUM (NO. 4), HELD OCTOBER 2-7, 1960 AT THE NATIONAL BUREAU OF STANDARDS, WASHINGTON 25, D. C. 31 Aug 62, 588p. 1,301 refs. NBS Monograph 43, Volume I.

DESCRIPTORS: *Cements, Chemistry, Conferences, Reports, Chemical equilibrium, Crystal structure, *Calcium compounds, *Silicates, X-ray diffraction analysis, Reduction, Coal, Aluminum compounds, Magnesium compounds, Oxides, Aluminates, Ferrites, Infrared spectroscopy, Precipitation, Solubility, Reaction kinetics, Steam, Hardening, Chemical reactions, Gypsum, Nuclear resonance, Minerals.

Contents:
Session I. General addresses
Session II. Chemistry of clinker
Session III. Chemistry of hydration of cement compounds
Session IV. Chemistry of hydration of Portland Cement

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National Bureau of Standards, Washington, D. C.
CHEMISTRY OF CEMENT. PROCEEDINGS OF THE INTERNATIONAL SYMPOSIUM (NO. 4), HELD OCTOBER 2-7, 1960 AT THE NATIONAL BUREAU OF STANDARDS, WASHINGTON 25, D. C. 27 Aug 62, 590p. 1,210 refs. NBS Monograph 43, Volume II.

DESCRIPTORS: *Cements, Chemistry, Conferences, Reports, *Concrete, Physical properties, Microstructure, Volume, Creep, Tensile properties, Elasticity, Deterioration, Chemical, Ice, Resistance,

Additives, Stresses, Slags, Calcium compounds, Aluminates, Magnesium compounds, Oxides, Refractory materials, Barium, Aluminum, Hardening.

Contents:
Session V. Properties of cement paste and concrete
Session VI. Destructive processes in concrete
Session VII. Chemical additions and admixtures
Session VIII. Special cements

Analytical Chemistry

TID-16565 $4.60

Michigan U., Ann Arbor.
LEWIS ACID-BASE TITRATION EMPLOYING MEGACYCLE-FREQUENCY OSCILLATORS. II. INTRODUCTION. TITRATION INVOLVING STANNIC CHLORIDE IN ACETONITRILE AND BENZENE SOLUTION, by Eldon T. Hitchcock and Philip J. Elving. Rept. no. 70 on Contract AT(11-1)-1148. 23 Aug 62, 41p. 35 refs.

AD-280 802 $2.60

Oklahoma State U., Stillwater.
SOME PROPERTIES OF UREASE, by G. Gorin, E. Fuchs and others. Rept. on Contract Nonr-2595(02). Rev. 17 May 62, 21p. 24 refs.

DESCRIPTORS: *Urease, Physical properties, Ultracentrifuges, Chemical properties, Chemical analysis, *Molecular structure, *Exchange reactions, *Polymerization, Thiols, Enzymes, Synthesis.

Samples of urease with reproducible specific activity, 153,000 Sumner Units/g., and absorption spectrum, $E^{1\%}_{1cm}$ 7.71 at 272 mμ, have been obtained. Ultracentrifugal analysis indicates a high degree of purity. The molecule (M. W. 473,000) contains about 77 methionyl, 29 cystinyl, and 47 cysteinyl residues. Some of the mercapto groups are very reactive and may be involved in exchange reactions with disulfide groups, causing polymerization. The mercapto groups essential for enzymatic activity are less reactive. (Author)

Organic Chemistry

PB 158 432 $1.60

Ohio State U. Research Foundation, Columbus.
KINETICS AND EQUILIBRIA OF FORMATION OF STABILIZED CARBANIONS, by H. Shechter, M. J. Collis and others. Final rept. 21 Sep 59-21 Sep 60, on Contract DA 33-019-ORD-3218. 15 Feb 61, 13p. 8 refs Rept. no. 1015; OOR rept. 2367:1; AD-253 434.

DESCRIPTORS: *Carbonates, Ions, *Reaction kinetics, *Chemical equilibrium, Monocyclic compounds, Alkyl radicals, *Ketones, Chemical reactions, Molecular structure, Neutralization, Ionization, Ethanes, Nitro radicals, Oxidation, Amines, Stability.

The kinetics of bromination of homologous phenyl cycloalkyl ketones were determined at various temperatures in 90% acetic acid as catalyzed by 0.53-mol HCl. The reactivity order with respect to ring size of the cycloalkyl group was 5, 4, 6, 3 in decreasing order. A study was initiated of the effects of ring size on the rates of acid- and base-catalyzed enolization of homologous cyclic ketones. The relative descending ordering of enolization of C_4 through C_8 cycloalkanones in acid-catalyzed bromination was 6, 8, 5, 7, 4. Successful methods were developed for synthesis and purification of 1-phenylnitroethanes containing the m- or p-substituents nitro, bromo, chloro, methyl, and methoxy.

TID-16695 $1.60

Tracerlab, Inc., Richmond, Calif.
SCINTILLATING ANION EXCHANGE RESIN, by A. H. Heimbuch. Progress rept. no. 2, on Contract AT(30-1)-2885. 10 Sep 62, 17p. 2 refs.

Physical Chemistry

AD-280 844 $1.10

Gates and Crellin Labs. of Chemistry, Calif. Inst. of Tech, Pasadena.
NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY. ABNORMAL SPLITTING OF ETHYL GROUPS DUE TO MOLECULAR ASYMMETRY. III, by George M. Whitesides, Fred Kaplan and others. Technical rept. no. 19 on Contract Nonr-220(26). Apr 62, 7p. 7 refs. Contribution no. 2842.

DESCRIPTORS: *Nuclear magnetic resonance, Resonance, Molecular spectroscopy, Organic compounds, *Ethyl radicals, Spectrographic analysis, Molecular rotation, *Nuclear spins, Protons, Methyl radicals, Resonance absorption.

See also AD-263 333.

NASA N62-16294 $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
STABILITY LIMITS OF THE PREMIXED STOICHIOMETRIC CYANOGEN-OXYGEN FLAME, by Irving Fruchtman. Oct 62, 25p. 17 refs. Technical note D-1480.

NASA N62-17372 $2.75

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
A GENERAL IBM 704 OR 7090 COMPUTER PROGRAM FOR COMPUTATION OF CHEMICAL EQUILIBRIUM COMPOSITIONS, ROCKET PERFORMANCE, AND CHAPMAN-JOUGUET DETONATIONS, by Frank J. Zeleznik and Sanford Gordon. Oct 62, 153p. 5 refs. Technical note D-1454.

TID-16128 $5.60

Princeton U., N. J.
THE COPRECIPITATION OF METALLIC IONS WITH CALCIUM CARBONATE, by H. D. Holland, M. W. Bodine, Jr. and others. Annual rept. on Contract AT(30-1)-2266. 15 June 62, 55p. 4 refs.

AD-280 903 $3.60

RIAS, Inc., Baltimore, Md.
THE EFFECT OF SUBSTITUTION ON IONIZATION POTENTIALS OF FREE RADICALS AND MOLECULES. II. THEORETICAL INTERPRETATION OF $'_K$ VALUES FOR ALKYL RADICALS AND AMINES, by Joyce J. Kaufman. Apr 62, 31p. 34 refs. Technical rept. 62-8.

DESCRIPTORS: *Alkyl radicals, *Amines, Substitution reactions, *Ionization potentials, *Free radicals, Molecules, Atomic orbitals, Electrons.

The constancy of $_K$ values [which measure the change in ionization potential between a substituted molecule (or radical) and the parent compound] for alkyl radicals and amines is discussed in terms of the energies and possible wave functions for these species and their corresponding positive ions. (See also PB 145 686)

AD-280 904 $2.60

RIAS, Inc., Baltimore, Md.
SOME THEORETICAL ASPECTS OF BONDING IN N-F COMPOUNDS, by Joyce J. Kaufman. Apr 62, 24p. 25 refs. Technical rept. 62-6.

DESCRIPTORS: *Chemical bonds, Bonding, Theory, *Nitrogen compounds, *Fluorides, Atomic orbitals, Quadripole moments, Ionization potentials.

A separation of the effects of substituent groups into distinct σ and π contributions and the influence of the σ and π contributions on Hamiltonians and wave functions of various cores, has proven useful to describe several diverse phenomena in N-F compounds.

EARTH SCIENCES

AD-279 105 $1.60

Pennsylvania State U., University Park.
MODEL STUDIES OF SEISMIC ENERGY DISTRIBUTION AROUND DIFFERENT TYPES OF SOURCE, by B. F. Howell, Jr., P. M. Lavin, and J. H. Pfluke. Progress rept. no. 5 on Vela-Uniform, Contract AF 19(604)7383. 28 Feb 62, 13p. ARPA Order no. 180-61.

DESCRIPTORS: *Geophysics, *Seismic waves, *Earth models, Simulation, Sources, Stresses, Deformation, Shear stresses, Energy, Wave transmission, Velocity, Experimental data.

(See also AD-267 425)

AD-280 629 $1.60

Electrical Engineering Research Lab., U. of Texas, Austin.
RESEARCH IN TROPICAL METEOROLOGY, by Wilfried H. Poryig and John R. Gerhardt. Interim technical rept. no. 1, 1 Nov 61-28 Feb 62, on Contract DA 35-039-sc-89179, continuation of Contract DA 36-039-sc-84937. [1962] 19p,

DESCRIPTORS: *Meteorology, Meteorological data, *Tropical regions, Jet streams (Meteorology), Caribbean Sea, Upper atmosphere, Air, Stratification.

This report presents specific investigations of mesoscale circulation features of the Caribbean area. These include a study of the convergence which occurred in May 1959 between a broad current from the northwest and a jet stream from the southwest in the Caribbean Sea and a description of an apparent typical upper air stratification which precedes the development of a tropical storm. (Author)

AD-279 239 $2.60

Meteorologic Lab., U. of Illinois, Urbana.
INVESTIGATION OF THE QUANTITATIVE DETERMINATION OF POINT AND A REAL PRECIPITATION BY RADAR ECHO MEASUREMENTS, by R. M. Johnson, E. A. Mueller, and G. E. Stout. Quarterly technical rept. no. 1, 1 Oct-31 Dec 61, on Contract DA 36-039-sc-87280. [1962] 21p.

DESCRIPTORS: *Raindrops, Photographic analysis, Electrostatic fields, Radar echo areas, Collecting methods, *Meteorological radar, Meteorological data, Processing.

Preliminary results of the raindrop data from Majuro and from Mt. Withington are discussed. Preliminary results of the analysis of the Majuro data are compared with the Miami data and show that Majuro rainshowers differ significantly from those at Miami, while continuous rains are the same. The status of data collection from the New Jersey and North Carolina sites is presented. (Author)

AD-280 290 $3.60

New York U. Coll. of Engineering, N. Y.
LOCAL WINDS CIRCULATION. VOLUME I: FURTHER STUDIES OF THEORETICAL SEA BREEZE MODELS, by Edwin L. Fisher. Final rept. 1 July 60-30 Sep 61, on Contract DA 36-039-sc-84939. [1961] 35p. 5 refs.

DESCRIPTORS: *Wind, *Sea breeze, Model tests, Theory, Jet streams (Meteorology), Shear stresses, Equations of motion, Meteorology.

A sea breeze model based on the vorticity equation was designed under a previous contract. The extension of this model to a system in which superposed flow exists is studied. In addition, in the course of examining the

errors generated in the original model, a primitive model of the sea breeze is designed. The model is brought to a stage of accuracy sufficient to follow the sea breeze development for a period of approximately 6 or 8 hours. The system does not, however, properly handle internal gravity waves, and the possible causes of this deficiency are examined. (Author)

Order from GPO $0.70
C 30.66/2:5.33

Weather Bureau, Washington, D. C.
CATALOGUE OF METEOROLOGICAL SATELLITE DATA - TIROS III TELEVISION CLOUD PHOTOGRAPHY, by Robert L. Pyle and Leslie A. Watson. 1962, 146p. 3 refs. Key to Meteorological Records Documentation no. 5.33.

DESCRIPTORS: *Satellite vehicle research, *Meteorological charts, *Clouds, Photography, Television, Catalogs.

Geology

BM-RI-6041 $1.25

Bureau of Mines, College Park, Md.
COMPARATIVE STUDIES OF EXPLOSIVES IN SALT, by Harry R. Nicholls and Verne E. Hooker. 1962, 50p. 9 refs.

UCRL-13039 $2.50

Colorado School of Mines Research Foundation, Inc., Golden.
SOURCES OF INFORMATION ON ROCK PHYSICS. CURRENT LITERATURE, by Lorraine Burgin. Final rept. on Contract W7405-eng-48. 28 Mar 62, 115p.

Order from GPO $1.25 as
I 19.16:426

Geological Survey, Washington, D. C.
DATA ON URANIUM AND RADIUM IN GROUND WATER IN THE UNITED STATES, 1954 TO 1957, by R. C. Scott and F. B. Barker. 1962, 118p. 14 refs. Geological Survey Professional Paper 426.

DESCRIPTORS: Geology, *Geological survey, *Hydrology, Water, Radioactive isotopes, Labeled substances, *Uranium, *Radium, Determination, *Natural radioactivity, *Geochemistry, Radiochemistry.

A compilation of data collected as part of a survey of radioelements in the water resources of the conterminous United States.

Order from GPO $1.00 as
I 19.3:1031-F

Geological Survey, Washington, D. C.
GEOLOGIC INVESTIGATIONS OF PROPOSED POWER-SITES AT SHEEP CREEK, CARLSON CREEK, AND TURNER LAKE, ALASKA. GEOLOGY OF WATER-POWER SITES IN ALASKA, by George Plafker. 1962, 130p. 9 refs. Geological Survey bulletin 1031-F.

DESCRIPTORS: *Geology, Geological survey, *Hydroelectric power systems, Hydraulic reservoirs, Dams, Water tunnels, Water supplies, *Alaska.

A description of the proposed reservoir, dam, and tunnel sites at each powersite, with conclusions and recommendations.

Order from GPO $1.00 as
I 19.3:1104-C

Geological Survey, Washington, D. C.
GEOLOGY OF SOUTH-CENTRAL HIDALGO AND NORTHEASTERN MEXICO, MEXICO. GEOLOGIC INVESTIGATIONS IN MEXICO, by Kenneth Segerstrom. 1962, 78p. 31 refs. Geological Survey bulletin 1104-C.

DESCRIPTORS: *Geology, Geological survey, *Mexico, *Minerals, Deposits.

Order from GPO $1.00 as
I 19.3:1121-D

Geological Survey, Washington, D. C.
GEOLOGY OF THE LINVILLE QUADRANGLE NORTH CAROLINA-TENNESSEE, A PRELIMINARY REPORT. CONTRIBUTIONS TO GENERAL GEOLOGY, by Bruce Bryant. 1962, 34p. 20 refs. Geology Survey bulletin 1121-D.

DESCRIPTORS: *Geology, Geological survey, *Mountains, Rock, Deposits, Economics, *North Carolina, *Tennessee.

Order from GPO $1.00 as
I 19.3:1121-L

Geological Survey, Washington, D.C.
GEOLOGY OF THE LITTLETON QUADRANGLE JEFFERSON, DOUGLAS, AND ARAPAHOE COUNTIES, COLORADO. CONTRIBUTIONS TO GENERAL GEOLOGY, by Glenn R. Scott. 1962, 58p. 42 refs. Geological Survey bulletin 1121-L.

DESCRIPTORS: *Geology, Geological survey, Rock, Sedimentation, *Colorado.

Bedrock and surficial geology of an area at the south edge of Denver, Colo.

TEI-787 $2.25

Geological Survey, Washington, D. C.
HYDROLOGIC SIGNIFICANCE OF SIX CORE HOLES IN CARBONATE ROCKS OF THE NEVADA TEST SITE, by Stuart L. Schoff and Isaac J. Winograd. July 61, 99p.

Order from GPO $1.25 as
I 19.16:403-B

Geological Survey, Washington, D. C.
MARINE GEOLOGY OF GUAM. GEOLOGY AND HYDROLOGY OF GUAM, MARIANA ISLANDS, by K. O. Emery. 1962, 81p. 49 refs. Geological Survey Professional Paper 403-B.

DESCRIPTORS: *Geology, *Hydrology, Pacific Islands, *Guam.

A study of the topography and sediments of submerged terraces, fringing reefs, channels, and the lagoon and of various shore features of a tropical island.

Order from GPO $1.25 as
I 19.3:1135-A

Geological Survey, Washington, D. C.
OXIDIZED ZINC DEPOSITS OF THE UNITED STATES: PART I. GENERAL GEOLOGY, by Allen V. Heyl and C. N. Bozion. 1962, 55p. 37 refs. Geological Survey bulletin 1135-A.

DESCRIPTORS: *Geology, *Minerals, Deposits, *Zinc, Oxides, Ores, Rock.

Descriptions of the many varieties of oxidized zinc deposits of supergene and hypogene origin.

Order from GPO $2.25 as
I 19.16:364

Geological Survey, Washington, D. C.
PLANT SPORES AND OTHER MICROFOSSILS FROM UPPER DEVONIAN AND LOWER MISSISSIPPIAN ROCKS OF OHIO, by Marcia R. Winslow. 1962, 103p. 194 refs. Geological Survey Professional Paper 364.

DESCRIPTORS: *Geology, Geological survey, *Paleoecology, Plants, *Spores, Microorganisms, Classification, Rock, *Ohio.

Stratigraphic occurrence, systematic classification, and illustration of plant microfossils.

Order from GPO $0.65 as
I 19.3:1141-G

Geological Survey, Washington, D. C.
A PLEISTOCENE ICE SHEET IN THE NORTHERN BOULDER MOUNTAINS JEFFERSON, POWELL, AND LEWIS AND CLARK COUNTIES, MONTANA. CONTRIBUTIONS TO GENERAL GEOLOGY, by Edward T. Ruppel. 1962, 25p. 28 refs. Geological Survey bulletin 1141-G.

DESCRIPTORS: *Geology, *Glaciers, Mountains, *Montana.

A descriptive report of the glacial geology in the northern part of the Boulder Mountains, Montana.

Order from GPO $1.25 as
I 19.13:1607

Geological Survey, Washington, D. C.
RECONNAISSANCE OF GROUND-WATER RESOURCES IN THE EASTERN COAL FIELD REGION, KENTUCKY, by W. E. Price, Jr., D. S. Mull, and Chabot Kilburn. 1962, 69p. 41 refs. Geological Survey Water-Supply paper 1607.

DESCRIPTORS: *Hydrology, Geological survey, Water, *Geology, *Kentucky.

TID-16110 $7.60

Princeton U., N. J.
ON SOME ASPECTS OF THE CHEMICAL EVOLUTION OF CAVE WATERS, by Heinrich D. Holland, Theodore V. Kirsipu and others. Rept. on Contract AT(30-1)-2266. Apr 62, 75p. 23 refs.

Oceanography

PB 159 967 $1.60

Bureau of [Naval Weapons] Washington, D. C.
BRIEF SUMMARY OF WIND SPEED, WIND WAVE AND SWELL DATA AT SELECTED POINTS ON THE EARTH'S SURFACE, by Robert T. Shea. July 51, declassified 10 Feb 61. 17p. 2 refs. DR rept. no. 1331.

DESCRIPTORS: *Oceanographic data, Sea water, *Water waves, Tides, *Wind, Velocity, Meteorology.

OTS SB-497 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
OCEANOGRAPHY. July 62, 24p. 371 refs. OTS Selective Bibliography SB-497.

DESCRIPTORS: *Bibliography, *Oceanography.

Lists 371 reports and translations added to the OTS collection up to August 1962. Covers research on marine physics; sound, temperature, and pressure measurements; structure of ocean depressions; underwater photography; marine biology; use of the bathythermograph; arctic drifts; underwater sound; ocean currents; ocean bottom topography and sediments among other subjects.

Physics of the Atmosphere

NASA N62-16030 $2.60

Geophysics Corp. of America, Bedford, Mass.
ROCKET MEASUREMENTS OF ELECTRON DENSITY AND TEMPERATURE IN THE NIGHTTIME IONOSPHERE, by L. G. Smith. Rept. on Contract NASw-98. Jan 62, 21p. 5 refs. GCA Technical rept. no. 62-1-N.

NASA N62-16288 $3.60

Stanford Electronics Labs., Stanford U., Calif.
IONOSPHERIC STUDIES WITH THE DIFFERENTIAL DOPPLER TECHNIQUE, by Fernando de Mendonca. Technical rept. no. 3 on Grant NsG-30-60. Juen 62, 36p. 28 refs. SEL-62-080.

ENGINEERING

AD-279 205 $5.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
DESIGN CRITERIA FOR CAMELS OR FLOATING FENDERS, by J. J. Leendertse. Final rept. 17 Jan 61, 56p. 25 refs. Technical rept. 174.

DESCRIPTORS: Ships, *Mooring, Piers, *Floats, Design, *Ship hulls, Impact shock, Vibration isolators, Hydraulic systems, Springs.

In a study to establish criteria for the design of a camel system suitable for the berthing of ships up to 20,000 tons displacement, analyses were made of existing camel and fender systems and determinations were made of the forces and movements induced by ships while berthing. Two designs, using concepts based on hydraulic and torsional principles, and meeting the determined requirements, were obtained. (Author)

Aeronautical Engineering

AD-281 370 $1.60

Civil Aeromedical Research Inst., Oklahoma City, Okla.
FAILURE OF REARWARD FACING SEAT-BACKS AND RESULTING INJURIES IN A SURVIVABLE TRANSPORT ACCIDENT, by A. Howard Hasbrook and John C. Earley. Apr 62, 14p. Rept. no. 62-7; NASA N62-12791.

DESCRIPTORS: *Aircraft seats, Design, *Aviation accidents, Aviation injuries, Aviation safety, Transport planes.

Photographs with captions showing seat-back failures and their causes and a description of the injuries sustained in a relatively low force transport accident are presented. (Author)

AD-280 212 $1.10

Civil Aeromedical Research Inst., Oklahoma City, Okla.
SONOTROPIC EFFECTS OF COMMERCIAL AIR TRANSPORT SOUND ON BIRDS, by John J. Swearingen and Stanley R. Mohler. Mar 62, 7p. 12 refs. Rept. no. 62-4; NASA N62-11578.

DESCRIPTORS: Commercial planes, Air transportation, *Birds, *Aviation accidents, Hazards, *Sound, Frequency, *Aviation safety, *Auditory signals.

The Electra sound spectrum contains an audible chirp which appears identical in frequency and wave form to the chirp of field crickets. Field observations strongly indicate that the sound of the taxiing Electra exerts an attraction for starlings, and possibly other birds, particularly in the fall in the Northeast, when insects suddenly become less plentiful. The implications of this attraction, "positive sonotropism", for air safety, are discussed. Recommended approaches to alleviating this type of bird hazard are presented. (Author)

NASA N62-17375 $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AN INVESTIGATION OF LANDING-CONTACT CONDITIONS FOR SEVERAL TURBOJET TRANSPORTS DURING ROUTINE DAYLIGHT OPERATIONS AT NEW YORK INTERNATIONAL AIRPORT, by Joseph W. Stickle. Oct 62, 23p. 7 refs.

NASA N62-16513 $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
INVESTIGATION OF VTOL APPROACH METHODS BY USE OF GROUND-CONTROLLED-APPROACH PROCEDURES, by James P. Trant, Jr. and Joseph S. Algranti. Oct 62, 28p. 5 refs. Technical note D-1489.

NASA N62-16514 $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
THE LOCATION AND SIMULATED REPAIR OF ROUGH AREAS OF A GIVEN RUNWAY BY AN ANALYTICAL METHOD, by Albert W. Hall and Sheldon Kopelson. Oct 62, 37p. 5 refs. Technical note D-1486.

NASA N62-16515 $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
THE LOWER BOUND OF ATTAINABLE SONIC-BOOM OVER-PRESSURE AND DESIGN METHODS OF APPROACHING THIS LIMIT, by Harry W. Carlson. Oct 62 14p. 13 refs. Technical note D-1494.

AD-280 895 $3.60

National Aeronautical Establishment, Ottawa (Canada).
A NOTE ON THE EFFECT OF VERY INFREQUENT LOAD RANGE CHANGES ON CUMULATIVE FATIGUE DAMAGE, by J. A. Dunsby and F. R. Thurston. Feb 62, 32p. 5 refs. Aeronautical rept. LR-331; NRC no. 6737.

DESCRIPTORS: *Fatigue (Mechanics) Structures, Stresses, Gust loads, Load distribution, Loading, Landing, Landing impact.

It has been confirmed experimentally that the infrequent interpolation of a changed load range on a basic fatigue loading can result in large changes in endurance which are not predicted by existing theories of cumulative damage. Several of the parameters involved have been

investigated and a new hypothesis is proposed which under certain circumstances enables these changes in endurance to be estimated from basic fatigue data. The results have obvious relevance to the very significant effect of landing loads on the fatigue endurance of aircraft structures. (Author)

NASA N62-17373 $3.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
OPERATIONAL EXPERIENCES OF TURBINE-POWERED COMMERCIAL TRANSPORT AIRPLANES. Oct 62 152p. 20 refs. Technical note D-1392.

AD-280 896 $2.60

National Research Council of Canada. Div. of Mechanical Engineering, Ottawa (Canada).
ICING TESTS OF A 10-FT. DELTA WING OF UNITY ASPECT RATIO HAVING LEADING EDGE SEPARATION, by C. K. Rush. Jan 62, 29p. 3 refs. Aeronautica rept. LR-337; NRC no. 6813.

DESCRIPTORS: *Triangular wings, *Ice, Model tests, Wind tunnels, Air speed, Vortices, *Leading edge flaps.

Icing tunnel tests have been made of a 10-ft. chord model to extend the range of previous tests made with a 4-ft. chord model. The tests substantiate the earlier findings and increase the range of applicability to full-scale flight. (Author)

AD-279 448 $1.60

National Research Council of Canada. Div. of Mechanical Engineering, Ottawa (Canada).
REVIEW OF ICING DETECTION FOR HELICOPTERS, by J. R. Stallabrass. Mar 62, 15p. refs. Aeronautical rept. LR-334; NRC no. 6768; NASA N62-10963.

DESCRIPTORS: *Helicopters, *Ice, Detection, *Rotor blades, Ice formation indicators, *De-icing systems, Flight instruments, Climatic factors.

An ice detector is a necessary component of any icing protection system for a helicopter, but at present no completely satisfactory instrument for this application exists. A number of methods suitable for the airborne detection of ice (mainly as applied to fixed wing aircraft) are described, and the special problems facing the application to helicopters are discussed. Those methods that have been tried on helicopters are reviewed, and it is concluded that the most satisfactory detector would be one that detects ice actually at the rotor blade. (Author)

Chemical Engineering

TID-16578(Pts. I&II) $4.60

Armour Research Foundation, Chicago, Ill.
CAPTURE OF HYDROPHILIC AND HYDROPHOBIC PARTICLES BY CONDENSING AND EVAPORATING WATER DROPLETS: PART I. EXPERIMENTAL STUDY. PART II. THEORY AND ANALYSIS OF EXPERIMENTS, by J. Rosinski, J. Stockham, and J. M. Pierrard. [1961] 42p. 21 refs.

TID-15969 $1.60

Engineering Research Labs., Columbia U., New York.
BASIC EXPERIMENTAL STUDIES OF BOILING FLUID FLOW AND HEAT TRANSFER AT ELEVATED PRESSURES, by Bruce Matzner. Monthly progress rept. for May 62 on Contract AT(30-3)-187. 31 May 62. 11p.

PB 181 425 $2.00

Syracuse U. Research Inst., N. Y.
FURTHER PROPERTIES OF HYDRATES AND HYDRATING AGENTS. Rept. for 1 July 62, on Contract 14-01-001-177. Jan 63, 77p. 26 refs. Saline Water Research and Development Progress rept. no. 70.

DESCRIPTORS: *Sea water, *Desalination, *Hydrates, *Methanes, Methyl radicals, *Bromides, Fluorides, Solubility, *Thermodynamics, Crystallization, Reaction kinetics, Cooling, Costs.

Thermodynamic properties of F-12B1 ($CClF_2Br$) have been determined to the extent necessary for design of desalting processes and these include heats of formation, hydrate composition and pressure-temperature phase relationship in aqueous sodium chloride solution from 0 to 10% strength. Many new data are presented on the solubility of several hydrating agents in water. A program has been started to study the kinetics of hydrate growth. Many of the most promising hydrating agents are relatively expensive when compared to propane and their thermodynamic advantages will of course be partially offset by their increased original and replacement costs. (See also PB 181 143)

Civil Engineering

PB 181 452 $2.50

Bureau of Yards and Docks, Washington, D. C.
GENERAL FORMULAS. Engineered Performance Standards, Public Works Maintenance. Nov 62, 101p. NAVDOCKS P-701.1, supersedes publication of Aug 58, PB 139 760.

DESCRIPTORS: Handbooks, *Operations research, Standards, *Maintenance, Maintenance personnel, Materials, Handling, Hazards, Construction, Electrical engineering, Machine shop practice, Paints, Pipe fittings, Plumbing, Welding, Piers.

Contents:
Travel, delay allowances, and material handling, travel time, heavy equipment travel, craft delay allowances, material handling, job preparation, hazardous work, moving and rigging, carpentry, masonry, electrical, custodial services, machine shop, machine repair, paint, pipefitting and plumbing, welding, sheetmetal, wharfbuilding, track maintenance, list of common EPS elements

PB 181 453 $1.00

Bureau of Yards and Docks, Washington, D. C.
MOVING RIGGING FORMULAS. Engineered Performance Standards, Public Works Maintenance. Dec 62, 32p. NAVDOCKS P-709.1, supersedes publication dated Oct 59, PB 145 006.

DESCRIPTORS: Handbooks, *Operations research, Standards, Maintenance personnel, *Hoists, *Naval shore establishments, Maintenance.

Contents:
Crane operation
Sling operations
Reeving
Hand rigging
Lashing
Winch operations
Shop operations
Weight capacity testing of motor-truck cranes

Electrical and Electronic Engineering

ANL-6604 $0.50

Argonne National Lab., Ill.
STABILIZED RELAXATION OSCILLATOR, by Charles Erwin Cohn. Rept. on Contract W-31-109-eng-38. Aug 62, 5p. NASA N62-16051.

PB 181 428 $0.50

Bureau of Naval Weapons, Washington, D. C.
CAPACITOR, DECADE: CORNELL-DUBILIER CDB-3 AND CDB-5. BuWeps-BuShips Calibration Program. 10 Sep 58, 16p. Standards Lab. Instrument Calibration Procedure AC-01, supersedes AC-10.

DESCRIPTORS: Instruction manuals, *Electronic equipment, *Capacitors, Calibration, Test equipment.

This procedure utilizes the General Radio capacitance bridge to measure the total capacitance for each decade step of the Test Instrument. The system residual capacitance is determined by using a 100 μμf capacitor in conjunction with the connecting leads to increase the value to be within the measurement range of the bridge.

PB 181 444 $0.50

Bureau of Naval Weapons, Washington, D. C.
COAXIAL DIRECTIONAL COUPLERS NARDA 3000-10, -20, -30. Technical manual, Navy Calibration Program. 1 Sep 62, 22p. Instrument Calibration Procedure GN-03.

DESCRIPTORS: *Coaxial cables, *Waveguide couplers, Calibration, Instrumentation, Instruction manuals.

This procedure describes the calibration of the Narda 3000-10, 3000-20, or 3000-30 Coaxial Directional Couplers, which operate in the frequency range from 225 Mc to 460 Mc with coupling values of 10, 20, or 30 db.

PB 181 445 $0.50

Bureau of Naval Weapons, Washington, D. C.
COAXIAL DIRECTIONAL COUPLERS NARDA 3003-10, -20, -30. Technical manual, Navy Calibration Program. 1 Aug 62, 22p. Instrument Calibration Procedure GN-06.

DESCRIPTORS: *Coaxial cables, *Waveguide couplers, Calibration, Instrumentation, Instruction manuals.

This procedure describes the calibration of the Narda 3003-10, 3003-20, or 3003-30 Coaxial Directional Couplers, which operate in the frequency range from 2000 Mc to 4000 Mc with coupling values of 10, 20 or 30 db.

PB 181 435 $0.50

Bureau of Naval Weapons, Washington, D. C.
CONSTANT-AMPLITUDE SIGNAL GENERATOR: TEKTRONIX-190A AND 190B. Technical manual, Navy Calibration Program. 1 Aug 62, 16p. Instrument Calibration Procedure AG-63.

DESCRIPTORS: Instruction manuals, *Electronic equipment, *Signal generators, Calibration, Test equipment.

This procedure describes the calibration of the Tektronix 190A or 190B Constant Amplitude Signal Generator. The signal generator supplies sine waves with an amplitude that remains constant within ±2% as the frequency is varied.

PB 181 429 $0.50

Bureau of Naval Weapons, Washington, D. C.
ELECTRONIC GALVANOMETER AND AMPLIFIER KIN TEL 204A. Technical manual, Navy Calibration Program. 15 Oct 62, 24p. Instrument Calibration Procedure AD-01.

DESCRIPTORS: Instruction manuals, *Electronic equipment, *Galvanometers, *Amplifiers, Calibration, Test equipment.

The Test Instrument is a transistorized DC null detector, linear deflection indicator, microvoltammeter, and DC amplifier.

PB 181 441 $0.50

Bureau of Naval Weapons, Washington, D. C. FREQUENCY METER TS-33/AP. Technical manual, Navy Calibration Program. 15 June 62, 12p. Instrument Calibration Procedure GF-05.

DESCRIPTORS: *Frequency meters, Superhigh frequency, Calibration, Instrumentation, Instruction manuals.

This procedure describes the calibration of the TS-33/AP frequency meter, which is a portable, indirect-reading frequency meter primarily designed to measure frequencies in the range of 8700 to 9500 Mc.

PB 181 432 $0.50

Bureau of Naval Weapons, Washington, D. C. GENERATOR, PULSE: HEWLETT PACKARD 212A AND AN/PPM-1. BuWeps-BuShips Calibration Program. 8 Feb 61, 20p. Standards Lab. Instrument Calibration Procedure AG-46.

DESCRIPTORS: Instruction manuals, *Electronic equipment, *Pulse generators, Calibration, Test equipment.

The HP 212A pulse generator is designed to provide high quality pulses which are variable in polarity, amplitude, repetition rate, and length (width). The pulses have fast rise and decay characteristics, and may be delayed or advanced to facilitate synchronizing with other equipment.

PB 181 433 $0.50

Bureau of Naval Weapons, Washington, D. C. GENERATORS, SIGNAL: AN/USM-27, AN/USM-27A AND AN/USM-27B. BuWeps-BuShips Calibration Program. 2 Feb 61, 20p. Standards Lab. Instrument Calibration Procedure AG-55.

DESCRIPTORS: Instruction manuals, *Electronic equipment, *Signal generators, Calibration, Test equipment.

The Test Instrument is a general purpose pulse generator which provides both positive and negative output pulses and positive and negative synchronizing pulses. The output pulses are variable in amplitude and duration and can be delayed in relationship to the synchronizing pulse.

PB 181 447 $0.50

Bureau of Naval Weapons, Washington, D. C. LEEDS AND NORTHRUP K-3 PRECISION POTENTIOMETER 7553. Department of the Navy Calibration Program. 1 Sep 62, 51p. Standards Lab. Instrument Calibration Technique DE-01.

DESCRIPTORS: *Precision equipment, *Potentiometers, Calibration, Instrumentation, Instruction manuals.

This document describes a laboratory technique which will provide quantitative information for the calibration of a Leeds and Northrup 7553 type K-3 universal guarded potentiometer. The design of the Leeds and Northrup 7553 potentiometer is known as a "difference potentiometer," i.e., the potential which appears at the EMF terminals results as the difference of two potential drops in parallel branch circuits. The K-3 potentiometer is provided with two guarding networks: however, in the technique herein described they will be of little concern. Since the inception of the K-3 potentiometer, the manufacturer has made modifications to the design. This technique will consider such changes and make appropriate notations as they are applicable.

PB 181 448 $0.50

Bureau of Naval Weapons, Washington, D. C. LEEDS & NORTHRUP PRECISION GUARDED WHEATSTONE BRIDGE 4232-B. Department of the Navy Calibration Program. 20 June 62, 41p. Standards Lab. Instrument Calibration Technique DR-01.

DESCRIPTORS: *Precision equipment, *Electric bridges, Calibration, Instrumentation, Instruction manuals.

This technique describes the calibration for the Leeds and Northrup 4232-B precision guarded Wheatstone bridge, designed for making direct current resistance measurements over a range of 1.0 ohm to 11,111.0 megohms. The bridge consists primarily of a rheostat arm and two ratio arms within a guarded network. The rheostat arm is made up of six decades, each of which has ten resistors of the same nominal value. The total resistance of the rheostat arm is 111,111.0 ohms, and is adjustable in steps of 0.1 ohm. The ratio arms consist of eight resistors in a plug and block arrangement, which allows any of the resistors to be selected for either ratio arm.

PB 181 449 $0.50

Bureau of Naval Weapons, Washington, D. C. MEASUREMENT OF MICROVOLTAGES, by K. H. Klarer. Department of the Navy Calibration Program. 15 June 62, 37p. 4 refs. Engineering circular EC-6.

DESCRIPTORS: *Voltmeters, *Potentiometers, Radio-frequency, Sources, Calibration, Instrumentation, Instruction manuals.

The accurate calibration of the output voltage level of radio frequency sources often requires special techniques and equipments. The need for special devices becomes greater as the frequency increases and as the level becomes lower. In addition, presently available electronic voltmeters have sensitivities and frequency capabilities which extend beyond normally available calibration sources. It is the purpose of this paper to discuss both the nature of some of these special devices and to describe how they may be used to attain confidence in the indicated values of voltmeters and signal sources.

PB 181 430 $0.50

Bureau of Naval Weapons, Washington, D. C. OSCILLATOR, AUDIO: HEWLETT PACKARD 200C. BuWeps-BuShips Calibration Program. 14 Oct 58, 26p. Secondary Standards Lab. Instrument Calibration Procedure AG-03.

DESCRIPTORS: Instruction manuals, *Electronic equipment, Audiofrequency, *Oscillators, Calibration, Test equipment.

The Test Instrument is a Wein bridge oscillator which provides sine-wave signals from 20 to 200,000 cps and has a rated output of 10 volts output minimum across a 1000-ohm load.

PB 181 431 $0.50

Bureau of Naval Weapons, Washington, D. C. OSCILLATOR, AUDIO: TS-382A/U THROUGH TS-382F/U. Technical manual, Navy Calibration Program. 28 Mar 60, rev. 1 Sep 62, 23p. Instrument Calibration Procedure AG-35.

DESCRIPTORS: Instruction manuals, *Electronic equipment, Audiofrequency, *Oscillators, Calibration, Instrumentation, Test equipment.

The Test Instrument is an oscillator with a frequency range of from 20 cps to 200 kc. It contains a vibrating reed frequency meter and an output voltmeter. The output voltage is variable from 0 to 10 volts into 1000 ohms.

PB 181 438 $0.50

Bureau of Naval Weapons, Washington, D. C. OSCILLOSCOPE: HEWLETT-PACKARD 130A AND 130B. Technical manual, Navy Calibration Program. 22 Jan 59, rev. 1 Sep 62, 24p. Instrument Calibration Procedure AW-03.

DESCRIPTORS: Instruction manuals, *Electronic equipment, *Oscilloscopes, Calibration, Test equipmen

The Test Instrument is an oscilloscope consisting of an internal calibrator, similar vertical and horizontal amplifiers providing 1 millivolt per centimeter sensitivity and a DC to 300 kc bandwidth, and sweep ranges from 1 microsecond per centimeter to 5 seconds per centimeter. A magnifier on the HP 130B provides a sweep time of 0.2 microseconds.

PB 181 439 $0.50

Bureau of Naval Weapons, Washington, D. C. OSCILLOSCOPES: TEKTRONIX 535 OR 545. BuWeps-BuShips Calibration Program. [1962] 63p. Standards Lab. Instrument Calibration Procedure AW-08, rev. 1.

DESCRIPTORS: *Instruction manuals, *Electronic equipment, *Oscilloscopes, Calibration, Test equipment

The Test Instrument is a high speed laboratory oscilloscope which has calibrated sweeps, calibrated delaying sweeps, sweep magnification, an internal calibrator and the necessary power supplies.

PB 181 434 $0.50

Bureau of Naval Weapons, Washington, D. C. PULSE GENERATOR: TS-592A/UPM-15, TS-592B/UPM-15 OR SG-343/UPM-15A. Technical manual, Navy Calibration Program. 1 Aug 62, 23p. Instrument Calibration Procedure AG-60.

DESCRIPTORS: Instruction manuals, *Electronic equipment, *Pulse generators, Calibration, Test equipment.

This procedure describes the calibration of the TS-592A/UPM-15, the TS-592B/UPM-15, or the SG-343/UPM-15A Pulse Generator, designed to produce output pulses with variable characteristics.

PB 181 443 $0.50

Bureau of Naval Weapons, Washington, D. C. SIGNAL GENERATOR HP 618B, HP 620A, TS-621/U(AN/URM-52), TS-621A/U(AN/URM-52A), TS-621B/U(AN/URM-52A). Technical manual, Navy Calibration Program. 9 Mar 59, rev. 1 Sep 62, 33p. Instrument Calibration Procedure GG-03.

DESCRIPTORS: Radiofrequency, *Signal generators, Generators, Calibration, Instrumentation, Instruction manuals.

This procedure describes the calibration of the following instruments: HP 618B, HP 620A, TS-621/U (AN/URM-52), TS-621A/U (AN/URM-52A), and TS-621B/U (AN/URM-52A), which are multi-purpose signal generators providing continuous-wave or pulse-modulated RF signals. Each instrument includes provisions for internal or external pulsed and frequency modulation.

PB 181 442 $0.50

Bureau of Naval Weapons, Washington, D. C. TEST SET WAVEMETER TS-117/GP. Technical manual, Navy Calibration Program. 29 Dec 60, rev. 1 Oct 62, 13p. Instrument Calibration Procedure GF-13.

DESCRIPTORS: *Test sets, *Wavemeters, Calibration, Instrumentation, Instruction manuals.

The Test Instrument is designed to be used as an indirect-reading wavemeter in the frequency range of 2400 to 3400 Mc. The input current is rectified by the crystal detector and indicated on the d-c microammeter in series with a sensitivity control. The cavity is designed so that this indication will peak or dip at resonance, depending upon the input selected.

PB 181 440 $0.50

Bureau of Naval Weapons, Washington, D. C.
TRANSISTOR CURVE TRACER TEKTRONIX 575. Technical manual, Navy Calibration Program. 14 Sep 59, rev. 1 Oct 62, 21p. Instrument Calibration Procedure AW-09.

DESCRIPTORS: *Oscilloscopes, *Transistors, Calibration, Instrumentation, Instruction manuals.

The Test Instrument is essentially an oscilloscope which displays the dynamic characteristic curves of a transistor on the screen of a 5-inch cathode ray tube. The four major sections of the Test Instrument are the vertical amplifier, horizontal amplifier, base step generator and collector sweep circuits. Switches in the vertical and horizontal amplifiers select the transistor parameter displayed and the amplitude of the applied signal. The base step generator supplies regulated current or voltage steps to the base of the transistor under test, while a rectified sine wave from the collector sweep circuits is applied to the collector.

PB 181 436 $0.50

Bureau of Naval Weapons, Washington, D. C.
VOLT-OHM-MILLIAMMETER, SIMPSON 260 SERIES II. BuWeps-BuShips Calibration Program. 4 June 59, 29p. Secondary Standards Lab. Instrument Calibration Procedure AQ-03.

DESCRIPTORS: Instruction manuals, *Electronic equipment, *Voltmeters, *Ohmmeters, *Ammeters, Calibration, Test equipment, Direct current, Alternating current.

This procedure utilizes the Radio Frequency Laboratory instrument calibration standard to calibrate the Test Instrument current, voltage, and resistance ranges. A linearity test is performed on the 50 volt dc and 2.5 volt ac ranges. Each remaining ac and dc range is measured for its full-scale value. The resistance ranges are calibrated at the midpoint on the scale.

PB 181 446 $0.50

Bureau of Naval Weapons, Washington, D. C.
VOLTAGE STANDING WAVE RATIO 3/8" COAXIAL, TYPE N CONNECTOR (3000 TO 10,000 MC). BuWeps-BuShips Calibration Program. 31 Jan 61, 18p. Standards Lab. Measurement System Operation Procedure HV-08.

DESCRIPTORS: *Voltage, *Standing wave ratios, *Electric connectors, Coaxial cables, Coaxial filters, Signal generators, Radiofrequency attenuators, Waveguide couplers, Calibration, Instrumentation, Instruction manuals.

This procedure describes the operation of a standards laboratory calibration system which is used to measure the voltage standing wave ratio of 3/8-inch coaxial instruments having type N connectors, and in the frequency range from 3000 Mc to 10,000 Mc. Single-ended instruments such as signal generators and terminations or double-ended instruments such as attenuators, directional couplers, and filters having a VSWR up to 10:1 may be calibrated using this system.

PB 181 437 $0.50

Bureau of Naval Weapons, Washington, D. C.
WAVE AND POWER METER SET: TS-107A/TPM-1. Technical manual, Navy Calibration Program. 1 Sep 62, 20p. Instrument Calibration Procedure AQ-17.

DESCRIPTORS: Instruction manuals, *Electronic equipment, *Wavemeters, *Power meters, Test equipment, Frequency, Attenuation, Calibration.

The Test Instrument consists of a power meter, wavemeter, attenuator, and crystal detector. It is capable of measuring frequency in the range of 500 to 1500 megacycles and average power in the range from 0.5 mw to 2 watts.

AD-281 600 $1.10

Electro-Optical Systems, Inc., Pasadena, Calif.
HIGH TEMPERATURE SEMICONDUCTING COMPOUNDS FOR THERMOELECTRIC POWER GENERATION, by C. B. Jordan. Bimonthly progress rept. no. 5, 15 Aug-15 Oct 61, on Contract NObs-84327. 15 Nov 61, 10p. EOS rept. 1592-2M-5.

DESCRIPTORS: *Thermoelectricity, Materials, *Semiconductors, Synthesis, Electrical conductance, Thermal conductivity, Resistance, *Chalcogenides, High temperature research, Thermoelectric generators.

Synthesis of the chalcogenides of normal compositions MCh_2 and M_2Ch_3 (where M = U or Th and Ch = S, Se, or Te) was carried out. The Seebeck coefficient was measured as a function of temperature for all of these except Th_2S_3, U_2S_3, and U_2Te_3. Electrical resistivity was measured as a function of temperature for $ThSe_2$, US_2, USe_2, and UTe_2 and at room temperature for all the remaining materials except U_2S_3 and U_2Te_3. Further development of the analytical methods was continued, and analyses of 7 of the 12 materials were obtained. (See also PB 160 842)

AD-279 606 $1.60

Lockheed Microsystems Electronics, Sunnyvale, Calif.
SYNTHESIS OF SOLID STATE DISTRIBUTION PARAMETER FUNCTIONS, by W. W. Happ, P. S. Castro, and W. D. Fuller. [1962] 20p. 7 refs. Rept. no. LMSC 6-59-62-2.

DESCRIPTORS: Synthesis, *Electrical networks, *Electronic circuits, Circuits, Thin films, Matrix algebra, Functions, Solid state physics

Film type distributed parameter circuits present the circuit designer with a wide range of function shaping networks. To exploit fully the potential of distributed parameter film type circuits, alternative techniques of shaping distributed parameter networks are proposed; these include variations in morphology and electrical parameters of multilayer structures to obtain network

functions not readily available from lumped parameter networks. An effective procedure of obtaining a wide range of network functions consists of generating subnetworks for multiterminal structures. Guide lines for establishing figures-of-merit of distributed parameter networks are proposed and illustrated by representative examples. (Author)

MND-P-2483-6 $0.50

Martin Marietta Corp., Baltimore, Md.
SNAP 7 PROGRAM. TASK 8, STRONTIUM-90 FUELED THERMOELECTRIC GENERATOR DEVELOPMENT, by W. A. McDonald. Quarterly progress rept. no. 6, 1 Feb-30 Apr 62, on Contract AT(30-3)-217. [1962] 22p.

MND-P-2761 $5.60

Martin [Marietta Corp.] Baltimore, Md.
TEN WATT STRONTIUM-90 FUELED GENERATOR FOR A DEEP SEA APPLICATION: SNAP-7E, by H. N. Berkow and V. G. Kelly. Final safety evaluation on Contract AT(30-1)-2958. May 62, 51p. 30 refs.

AD-279 232 $1.60

Microwave Lab., Stanford U., Calif.
MULTIMEGAWATT BROADBAND MICROWAVE TUBES. Quarterly memo. no. 1, 1 Sep-30 Nov 61, on Contract AF 30(602) 2575. Jan 62, 14p. M. L. rept. no. 881. RADC-TDR-62-17.

DESCRIPTORS: Broadband, *Electron tubes, *Microwave equipment, *Traveling wave tubes, Backward-wave amplifiers, Backward-wave oscillators, Electron beams, Electron guns, Klystrons, Radiofrequency power, Power.

Progress is reported on ten megawatt cloverleaf TWT, tapered structures, long-slot TWT, centipede TWT, electron stick, hollow beam guns, extended-interaction klystrons, non-periodic dielectric-lined high-power TWT, and periodic circuit measurement techniques.

PB 158 708 $1.60

Naval Air Test Center, Patuxent River, Md.
EVALUATION OF 8,200 - 37,500 MC/S OA-2486 (XN-1)/USM-107 ANTENNA PATTERN MEASURING EQUIPMENT, by M. C. Fairall. Rept. no. 1 (Final). 9 Oct 61, 17p. 1 ref. WST42-652.

DESCRIPTORS: *Antenna radiation patterns, Measurement, Test equipment, Backward wave oscillators, Power supplies, Radio recievers, Frequency meters, Crystal detectors, Attenuation, Frequency, Stability.

The antenna test set group, OA-2486(XN-1)/USM-107, extends the frequency range of antenna radiation pattern measuring equipment AN/USM-107(XN-1) from 10.5 to 37.5 gc (gigacycle or kilomegacycle). This equipment covers the frequency range from 8.4 to 37.5 gc. It consists of three backward-wave oscillators and associated power supplies housed in five separate units and a case of receiver components. The receiver components consist of frequency meters, variable attenuators, E-H transmission-line tuners and crystal detectors. The units of the test set group were evaluated and found to be satisfactory for use by aircraft manufacturers and laboratories requiring instrumentation for antenna radiation tests in the 8.4 to 37.5 gc frequency range. (Author)

NASA N62-10167 $5.60

Space Technology Labs., Inc., Los Angeles, Calif.
CHARGED PARTICLE RADIATION DAMAGE IN SEMICONDUCTORS. I. EXPERIMENTAL PROTON IRRADIATION OF SOLAR CELLS, by J. M. Denney and R. A. Downing. Final rept. on Contract NAS5-613. Sep 61, 51p. 5 refs. 8987-0001-RU-000.

NASA N62-14743 $1.60

Yale U., New Haven, Conn.
USE OF THE TUNNEL DIODE AS A MEMORY CELL IN DATA PROCESSING SYSTEMS, by James A. Bergey. Technical note no. 2 on Grant NsG-138-61. July 62, 19p. 7 refs.

Mechanical Engineering

PB 181 451 $3.00

Bureau of Yards and Docks, Washington, D. C.
PIPEFITTING PLUMBING FORMULAS. Engineered Performance Standards, Public Works Maintenance. Nov 62, 168p. NAVDOCKS P-711.1, supersedes issue dated Aug 58.

DESCRIPTORS: *Pipefittings, *Plumbing, Pipes, Taps, Gaskets, Copper tubing, Welding, Sprinklers, Water heaters, Water supplies, Handbooks.

The time formulas developed for pipefitting and plumbing are: cut and thread small pipe, measure for pipe installation, installation or removal of threaded pipe assemblies (up to 2" ID), make and install pipe supports, remove and reinstall concrete or clay pipe, install and remove pipe insulation, make ring gaskets (up to 12" OD), miscellaneous time values, install or remove bell and spigot sewer pipe, water pipe, and fittings (up to 42" ID), cut and assemble copper tubing, cut and thread 2-1/2" to 4" pipe, installation or removal of threaded pipe assemblies (2-1/2" ID through 6" ID inclusive), hydrostatic and steam test, maintenance of fire hydrants and sprinkler systems, pipe fit up for welding, burn and remove pipe, cut, ream, and thread 4" to 6" ID pipe by machine, gas water heater repair, supply water to ships.

AD-279 913 $3.60

Naval Boiler and Turbine Lab., Philadelphia, Pa. DEVELOPMENT OF A SINGLE ELEMENT FEED-WATER REGULATING SYSTEM, by P. H. Zavod. 20 Mar 62, 34p. NBTL Proj. B-458.

DESCRIPTORS: Navel vessels, Boilers, Feed water, Control systems, Design, *Feed water regulators.

A number of single element feedwater regulating system were developed. All systems actually evaluated on the boiler controlled water level satisfactorily. The system selected as optimum utilized less than maximum control loop gain and a high frequency signal attenuator to increase process stability and reduce rapid load variations on the main feed pump. This system consisted of a proportional plus derivative plus integral action controller whose output signal loaded the valve position control loop of a semi-proportionalized valve. (Author)

AD-280 354 $1.60

Naval Boiler and Turbine Lab., Philadelphia, Pa. DEVELOPMENT OF A TRANSPIRATIONALLY COOLED BAFFLE FOR USE IN HIGH TEMPERATURE GAS REGIONS, by J. W. Banham, Jr., C. A. Breslin, and T. P. Tursi, Jr. 12 Mar 62, 19p. RDT&E rept. no. B-454.

DESCRIPTORS: *Sweat cooling, Damping, *Boilers, Boiler tubes, Gas flow, Cooling, Air cooled, Porous materials, Refractory materials, Tests, Pressure.

In an effort to eliminate the problems attendant to refractory gas baffles in Naval boilers, a light weight, stainless steel, transpirationally cooled baffle was developed. This baffle was of hollow construction and had a porous skin; internally pressurizing the baffle with air permitted control of skin temperatures by virture of air leakage through the skin pores. Evaluation of the test baffle was conducted using a separate, controlled source of cooling air; a full size prototype baffle would use forced draft blower combustion air for cooling. Baffle performance was unsatisfactory for use in Naval boilers for three principal reasons: (a) cooling air flow required to maintain desired skin temperatures was excessive, (b) pressure drop required for adequate cooling air supply was excessive, and (c) skin pores tended to clog during boiler operation. (Author)

PB 158 881 $5.60

Naval Boiler and Turbine Lab., Philadelphia, Pa. EVALUATION OF SCREEN TUBE FAILURES; BOILER 1B USS INDEPENDENCE (CVA62), AUGUST 1961, by W. A. Fritz, Jr. and T. P. Tursi, Jr. 12 Oct 61, 56p. NBTL Proj. B-512.

DESCRIPTORS: *Boilers, *Boiler tubes, *Failure (Mechanics), Marine engines, Rupture, Heat transfer, Shipborne, Plastic flow, Metals, Cleaning, Aircraft carriers.

Boiler 1B of the USS INDEPENDENCE, CVA-62, suffered a casualty involving the rupture of five tubes in the RA screen row. On-the-spot investigations and repairs were made and a detailed investigation was conducted at the Laboratory to determine cause. Based on these investigations it was concluded that failure was caused by a localized build-up of waterside deposits resulting in restricted heat transfer through the tube walls with attendant tube metal overheating and subsequent blistering and rupture. (Author)

AD-279 072 $1.60

Naval Boiler and Turbine Lab., Philadelphia, Pa. PROJECTILE BRUSH CLEANING OF MAIN BOILER TUBES, by W. A. Fritz, Jr. and E. T. Mitnaul. Final rept. Dec 59-Apr 61. 28 Feb 62, 12p. NBTL Proj. B-418.

DESCRIPTORS: *Boiler tubes, Cleaning, Projectiles, *Brushes, Guns, Tests.

The projectile brush method for the mechanical cleaning of bent boiler tubes is not superior to the turbine driven method of brush cleaning. Projectile brush cleaning is expeditious and facile, but the possibilities of brushes lodgine in tubes and the rebounding of brushes from the brush catcher back into a tube are detrimental characteristics. The brush used by the British Navy was considerably superior to the other projectile type brushes evaluated. One size brush cannot be used to clean tubes of the same OD, but having varying wall thicknesses. Projectile brush cleaning is unsatisfactory for cleaning superheater tubes, owing to the inability of the brushes to pass through the 3" radius U-bends. (Author)

AD-280 184 $2.60

Naval Boiler and Turbine Lab., Philadelphia, Pa. USE OF INCONEL TUBES IN A CARBON STEEL FIRE-TUBE TYPE BOILER, by J. J. Hardish. 28 Mar 62 28p. 5 refs. Evaluation rept. B-443.

DESCRIPTORS: *Boilers, *Boiler tubes, Materials, Chromium alloys, Iron alloys, Nickel alloys, Alloys, Tests, Steel tubing, Auxiliary power plants, Feasibility studies.

A 2500 lb/hr carbon steel fire-tube type auxiliary boiler was equipped with Inconel tubes to determine the feasibility of Inconel as a tube material from the installation and fabrication standpoint. If practical, this would permit utilization of the superior corrosion resistant properties and probable longer service life of Inconel. Boiler performance obtained with the Inconel tubes was essentially the same as that with an identical all carbon steel unit. To the extent determinable by visual inspection, Inconel appears to be a satisfactory material for this application. Procedure for installation of these tubes in a carbon steel boiler was established. (Author)

NASA N62-17376 $1.00

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
ANALYTICAL STUDY OF THE TUMBLING MOTIONS OF VEHICLES ENTERING PLANETARY ATMOSPHERES, by Murray Tobak. Oct 62, 32p. 11 refs. Technical note D-1549.

NASA N62-16297 $0.75

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
ATMOSPHERE ENTRIES WITH SPACECRAFT LIFT-DRAG RATIOS MODULATED TO LIMIT DECELERATIONS, by Lionel L. Levy, Jr. Oct 62, 26p. 7 refs. Technical note D-1427.

Order from GPO $1.00 as
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Committee on Aeronautical and Space Sciences, United States Senate, Eighty-Seventh Congress, Second Session.
MANNED SPACE FLIGHT PROGRAM OF THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION: PROJECTS MERCURY, GEMINI, AND APOLLO. Staff rept. 4 Sep 62, 249p.

DESCRIPTORS: *Space flight, *Astronauts, Space medicine, Space capsules, *Satellite vehicles, *Booster rockets, Guidance, Tracking, Orbital flight paths, Recovery, *Satellite rendezvous vehicles.

Order from GPO $0.75 as
D 1.6/2:P94

Department of Defense, Washington, D. C.
DOD AND NASA GUIDE. PERT COST SYSTEMS DESIGN. June 62, 149p. 8 refs. NASA N62-16057.

DESCRIPTORS: Department of Defense, Aeronautics, *Military research, Weapons, *Operations research, *Management engineering, *Economics, Costs, Handbooks.

The Performance Evaluation and Review Technique (PERT) System is expanded to incorporate the schedule and cost data needed by contractor and government management to identify present and project trouble spots. (NASA abstract)

NASA N62-16811 $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
A METHOD OF ACCURATELY REDUCING THE SPIN RATE OF A ROTATING SPACECRAFT, by Henry J. Cornille, Jr. Oct 62, 10p. 4 refs. Technical note D-1420.

NASA N62-16703 $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
ROTATIONAL DECAY OF THE SATELLITE 1960 ETA 2 DUE TO THE EARTH'S MAGNETIC FIELD, by Raymond H. Wilson, Jr. Oct 62, 16p. 5 refs. Technical note D-1469.

AD-279 587 $3.60

Human Engineering Labs., Aberdeen Proving Ground, Md.
A PRELIMINARY HUMAN ENGINEERING EVALUATION OF HEAVY MORTAR SYSTEM PERFORMANCE, by Robert T. Gschwind and Gary L. Horley. Jan 62, 39p. Technical memo. 3-62.

DESCRIPTORS: Human engineering, *Fire control, *Mortars, Ammunition, Handling, Training, Target angle, Target plotters, Range finding, Achievement tests.

A field investigation was conducted at Ft. Benning, Georgia, to measure the terminal accuracy of the heavy mortar system with all aspects of field operation included. Twenty-seven officer students performed the field test phase of training at the completion of a U. S. Army Infantry School course in heavy mortars. They performed forward observation, fire direction center operation, mortar laying, and ammunition handling during several types of typical mortar missions. The accuracy and number of rounds used were recorded for 22 missions. The mean number of rounds to achieve fire for effect was 5.3, with an associated average deviation from the target of 4.4 percent of the observer-target range. However, there were definite differences in results for different types of missions. (Author)

NASA N62-16368 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
NUCLEAR ELECTRIC SPACECRAFT FOR UNMANNED PLANETARY AND INTERPLANETARY MISSIONS, by Dwain F. Spencer, Leonard D. Jaffe and others. Rept. on Contract NAS7-100. 25 Apr 62, 15p. 3 refs. Technical rept. no. 32-281.

NASA N62-16370 $3.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SCIENTIFIC EXPERIMENTS FOR MARINER R-1 AND R-2, ed. by R. C. Wyckoff. Rept. on Contract NAS7-100. 15 July 62, 38p. 42 refs. Technical rept. no. 32-315.

NASA N62-14458 $13.50

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-15, VOLUME IV, SUPPORTING RESEARCH AND ADVANCED DEVELOPMENT. Rept. on Contract NAS7-100. 30 June 62, 198p. JPL-SPS-37-15, Vol. IV; NP-11962.

NASA N62-16360 $7.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-16, VOLUME VI. SPACE EXPLORATION PROGRAMS AND SPACE SCIENCES. Rept. for 1 May-1 Aug 62 on Contract NAS7-100 31 Aug 62, 73p. 2 refs.

NASA N62-17374 $1.25

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
ERECTABLE YAGI DISK ANTENNAS FOR SPACE-VEHICLE APPLICATIONS, by William F. Croswell and Melvin C. Gilreath. Oct 62, 43p. 4 refs. Technical note D-1401.

NASA N62-16711 $1.25

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
FIXED-BASE-SIMULATOR STUDY OF PILOTED ENTRIES INTO THE EARTH'S ATMOSPHERE FOR A CAPSULE-TYPE VEHICLE AT PARABOLIC VELOCITY, by John W. Young and Walter R. Russell. Oct 62, 53p. 8 refs. Technical note D-1479.

NASA N62-16701 $1.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
FIXED-BASE-SIMULATOR STUDY OF THE ABILITY OF A PILOT TO PERFORM SOFT LUNAR LANDINGS, by M. J. Queijo, G. Kimball Miller, Jr., and Herman S. Fletcher. Oct 62, 69p. 10 refs. Technical note D-1484.

AD-280 902 $1.60

Malaker Labs., Inc., Mountainside, N. J.
DETERMINING A METHOD TO INHIBIT THE INTERACTION OF ALKALI PERCHLORATE AND WATER, by C. J. Anderson and R. Del Grosso. Progress rept. no. 4, 1 May-30 Sep 61, on Contract DA 30-069-ORD-3202. [1961] 19p. Rept. no. CM 106-7.

DESCRIPTORS: *Pyrotechnics, *Calcium compounds, *Nitrates, Powders, Water, Absorption, Inhibition, Dehydration, *Coatings, *Carbonates, Carbon dioxide, Carbon compounds, Monoxides, Hydrogen compounds, Fluorides, Perchlorates.

Samples of calcium nitrate were treated at temperatures up to 200°C with gaseous reactants (CO, CO_2 and HF) at pressures up to 100 psi. In these tests, the powder was in a small boat during the treatment. The reaction was not uniform and there occurred some caking at the higher temperatures. Yet, there was no significant difference in the hygroscopicity of the resulting powders. Chemical analysis of the powder indicated that calcium carbonate was formed as a result of the carbon monoxide and carbon dioxide reactions with the nitrate. All of the treated samples were slightly better than the untreated. It was observed that during the testing of the various powders for water pickup, the weight increase per unit weight of powder varied with sample weight. Attempts to correct the weight increase to unit sample weight, assuming a surface or a homogeneous reaction, were unsatisfactory. (Author)

WT-1102 $9.60

Naval Ordnance Lab., White Oak, Md.
SHOCK WAVE PHOTOGRAPHY, by J. F. Moulton, Jr. and E. R. Walthall. Rept. for Feb-May 55, on Operation Teapot. 15 May 58, declassified 20 Sep 60. 112p. 25 refs.

AD-280 683 $1.60

Naval Weapons Lab., Dahlgren, Va.
SUMMARY OF TERRIER STRUCTURAL FIRING TESTS IN THE CLG-6 AND DLG-9 CLASS SHIPS, by J. J. Walsh, Jr. May 62, 18p. 13 refs. NWL rept. no. 1810.

DESCRIPTORS: Ships, Guided missiles, *Guided missile boosters, Boosters, Blast, Hazards, *Test vehicles, Guided missile personnel, Personnel, Safety, Damage control.

TERRIER structural firing (blast) tests have been conducted in the CLG-6, 7, and 8 and DLG-6 through 15 guided missile ships. The tests were conducted to investigate the adequacy of the protection for TERRIER launching system personnel against blast effects and to determine the effects of the booster blast on the ship's structure. There was no major structural deficiency observed during the conduct of any structural firing tests. A summary of the ships tested, damage incurred, recommendations, and actions on recommendations is included in this report. (Author)

AD-281 284 $2.60

Watervliet Arsenal, N. Y.
TRANSIENT THERMAL STRESSES IN GUN TUBES, PART II, by M. J. Pascual, J. E. Zweig and others. May 62, 30p. 10 refs. Technical rept. WVT-RR-6208.

DESCRIPTORS: *Gun barrels, *Thermal stresses, Transient, Thermal expansions, Temperature, Numerical analysis, Stresses.

A study was made to determine the temperature field and thermal stress distribution in a gun tube (circular hollow cylinder) assumed, for simplicity, to be infinitely long. The temperature function was assumed to have axial and angular symmetry and therefore was dependent only upon radial distance and time. The initial and boundary conditions were so constructed as to closely approximate those encountered during the repeated firing of a gun. All quantities are in dimensionless form. The dimensionless temperature field and thermal stress distribution were determined in infinite series form. Numerical results were obtained for a typical set of values of the parameters involved, by the use of an IBM 650 digital computer. (Author) (See also PB 161 475).

Sanitation and Safety Engineering

WT-1112 $1.60

Army Signal [Research and Development Lab.] Fort Monmouth, N. J.
EVALUATION OF A RADIOLOGICAL DEFENSE WARNING SYSTEM (PROJECT CLOUDBURST), by T. E. Petriken. Rept. for Feb-May 55, on Operation Teapot. 16 Aug 57, declassified 24 Nov 61. 14p. 5 refs.

HW-SA-1993 $1.10

[Hanford Atomic Products Operation] Richland, Wash.
A LIQUID NITROGEN LEVEL CONTROLLER, by I.T. Myers and L.C. Davenport. Rept. on Contract AT(45-1)-1350. [1961] 3p.

AD-278 730 repriced $2.75

Structrual Mechanics Research Lab., U. of Texas, Austin.
ANALYSIS OF STRUCTURAL DAMAGE FROM THE 1960 TSUNAMI AT HILO, HAWAII, by Hudson Matlock, Lymon C. Reese, and Robert B. Matlock. Rept. on Contract DA 49-146-XZ-028. Mar 62, 140p. 15 refs. DASA 1268.

DESCRIPTORS: *Ocean waves, *Buildings, *Water waves, *Disasters, Structures, Mathematical analysis, Urban areas, Hawaii, Vulnerability, Floods.

A study was made of Hilo on the Island of Hawaii after the tsunami of 1960 to survey the damage. The principal items studied were the general wave characteristics and the structural damage caused by the waves. The portion of the survey which pertained to onshore effects is reported. Included are studies of height of wave, structural damage caused by the wave, and the pressures on structures from the force of the wave. The velocity of the wave was estimated by three different methods. Reasonable agreement was noted among the three methods. The damage caused by the tsunami is discussed in some detail together with the various conditions which affected the degree of damage. Analyses of several structural elements are presented and conclusions and recommendations are formulated. (Author)

FOOD, HANDLING, AND PACKAGING EQUIPMENT

AD-281 308 $1.10

National Dairy Products Corp., Glenview, Ill.
IRRADIATION OF FRESH FRUITS AND VEGETABLES AND DAIRY PRODUCTS, by W. L. Hock. Rept. no. 4 (Final), 9 Dec 58-8 Dec 61. [1961] 7p. File no. S-750.

DESCRIPTORS: *Food, *Preservation, Fruits, Vegetables, Milk, Eggs, *Radiation effect.

Studies on irradiation of several food products were started, but because of unfavorable flavor characteristics developed by the irradiation, the programs were not continued. Dried whey of varying bacterial counts required dosages between 0.8 and 1.6 megarads to reduce the count to "less than 10" per gram. Irradiation of the whey even up to 3.0 megarads produced no detrimental flavor in white sauce prepared from the whey. Strawberry preserves in covered glass jars were surface irradiated in doses up to 1.0 megarad. A decrease in mold count was evident and no irradiation odor was produced but bleaching and flavor loss occurred at the surface. Raw whole milk was irradiated at several dosage levels and found to have a flavor of burnt feathers and rancidity. (Author)

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

DC 57-4-146 $4.60

General Electric Co., Cincinnati, Ohio.
HYDRODYNAMIC AND HYDROSTATIC LUBRICATED BEARINGS WITH PARTICULAR REFERENCE TO AIR BEARINGS, -A BIBLIOGRAPHY, by M. A. Koenders. Rept. on Contract AT(11-1)-171. 25 Apr 57, 43p. 93 refs.

Engines and Propulsion Systems

NASA N62-14261 $1.10

Electro-Optical Systems, Inc., Pasadena, Calif.
CONDENSER HEAT REJECTION SYSTEMS, by Lance Hays. Monthly progress rept. 1 June-1 July 61, on Contract NAS7-11. 10 July 61, 10p. 1 ref. EOS-1588-ML-8.

DC-55-7-71 $1.60

General Electric Co., Cincinnati, Ohio.
AIRCRAFT REACTOR CONTROL SYSTEM APPLICABLE TO TURBOJET AND TURBOPROP POWER PLANTS, by G. E. Gorker. Rept. on Contract AT(11-1)-171. 19 July 55, declassified 13 June 61, 14p.

APEX-906 $3.00

General Electric Co., Cincinnati, Ohio.
HEAT TRANSFER REACTOR EXPERIMENT NO. 3, by F. C. Linn. Comprehensive technical rept., General Electric Direct-Air-Cycle Aircraft Nuclear Propulsion Program, Contract AT(11-1)-171. 15 June 62, 206p. NASA N62-15684.

NASA N62-16510 $2.00

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
NUMERICAL SOLUTION OF TWO-DIMENSIONAL POISSON EQUATION: THEORY AND APPLICATION TO ELECTROSTATIC-ION-ENGINE ANALYSIS, by Vladimir Hamza and Edward A. Richley. Oct 62, 82p. 13 refs. Technical note D-1323.

NASA N62-16009 $1.00

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
PERFORMANCE OF SEVERAL CAST NICKEL-BASE ALLOYS AS TURBOJET-ENGINE BUCKET MATERIALS AT 1650°F, by James R. Johnston, Charles A. Gyorgak, and John H. Sinclair. Sep 62, 37p. 11 refs. Technical note D-1318.

NASA N62-16291 $13.00

Marquardt Corp., Van Nuys, Calif.
PYROLYTIC GRAPHITE ROCKET THRUST CHAMBER DEVELOPMENT, by J. G. Campbell, M. D. Carey, and C. D. Coulbert. Final rept. 8 June 61-7 June 62, on Contract NAS7-54. 31 July 62, 190p. 160 refs. Rept. 5907.

MATERIALS

AD-279 593 $8.10

Little, Arthur D., Inc., [Cambridge, Mass.]
DISPOSABLE CLOTHING AND SHELTERS: MATERIALS, DESIGN, AND FABRICATION TECHNIQUES. Rept. no. 2 (Final), 5 Sep 60-5 Sep 61, on Contract DA 19-129-qm-1528. Dec 61, 82p. Rept. no. C-62634

DESCRIPTORS: Armed forces, *Clothing, *Tents, *Shelters, Design, Materials, *Paper, *Disposal, Stresses, Feasibility studies.

These studies indicate that the concept of disposable clothing and shelter is worthwhile, especially in instances where it is impractical to provide the services necessary to launder and repair textile apparel.

AD-280 732 $1.60

Naval Supply Research and Development Facility, Bayonne, N. J.
DEVELOPMENT OF PERMEABLE FABRICS FOR HYDROGEN PEROXIDE FUEL HANDLERS' CLOTHING. PHASE II: FABRIC DEVELOPMENT AND FINISHING, by Jack Naimer. Feb 62, 19p. 3 refs. Clothing and Textile Division rept. no. 57.

DESCRIPTORS: Textiles, *Synthetic fibers, Design, Finishes, Permeability, Physical properties, Fuels, Hydrogen compounds, Peroxides, Protective clothing, Textiles, *Clothing.

A program was initiated to develop permeable fabrics suitable for hydrogen peroxide fuel handlers' clothing. This report deals with the development and laboratory evaluation of four experimental fabrics of Dynel and Verel, fibers which are inherently fire retardant. Physical fabric parameters were tested to determine which of the candidate fabrics would provide best all-around performance. The fabrics were treated commercially with Phobotex FTA, a repellent which, when applied to Dynel and Verel, had been found to be both compatible with hydrogen peroxide and durable to laundering. (Author)

Adhesives and Sealants

PB 159 132 $3.60

Material Lab., New York Naval Shipyard, Brooklyn.
DESIGN MANUAL ON ADHESIVE BONDED GLASS REINFORCED PLASTIC JOINTS. Progress rept. 8. 13 June 58, 34p. Lab. Project 5616-1.

DESCRIPTORS: *Adhesives, *Bonding, *Glass textiles, Laminated glass, *Plastics, Epoxy resins, *Reinforcing materials, *Bonded joints, Fatigue (Mechanics), Military requirements.

Contents;
Characteristics of glass reinforced plastics affecting joint design
Butt joints
Lap joints
Scarf joints
Right angled joints
Rod and tubular joints

Combination joints
Formation and reinforcement of GRP joints with wet layups
Testing of strength of adhesive bonded GRP joints

PB 159 131 $1.60

Material Lab., New York Naval Shipyard, Brooklyn.
INSTRUCTION MANUAL FOR ADHESIVES FOR GLASS REINFORCED PLASTICS. Progress rept. 6. 16 Jan 58, 16p. Lab. Project 5616-1.

DESCRIPTORS: *Adhesives, *Bonding, *Glass textiles, Plastics, Epoxy resins, *Reinforcing materials, *Bonded joints, Fatigue (Mechanics), Thermosetting resins.

Contents:
Glass reinforced plastics
Adhesives for glass reinforced plastics
Bonding techniques
Properties of adhesives
General information

Ceramics and Refractories

UCRL-6937 $1.60

Lawrence Radiation Lab., U. of California, Livermore
CHARACTERIZATION OF LOW-TEMPERATURE FAILURES IN SILICIDE COATINGS, by Gerald F. Rynders. Rept. on Contract W-7405-eng-48. 8 June 62, 11p. 7 refs.

TID-11794 $1.60

Los Alamos Scientific Lab., N. Mex.
A COMPARISON OF THE INERT GAS-FUSION AND VACUUM EXTRACTION METHODS FOR THE DETERMINATION OF OXYGEN IN REFRACTORY METALS, by Maynard E. Smith and Glenn R. Waterbury. 13p. 15 refs. LADC-4679.

Fuels, Lubricants, and Hydraulic Fluids

NASA N62-16292 $1.25

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
EFFECT OF NINE LUBRICANTS ON ROLLING-CONTACT FATIGUE LIFE, by Erwin V. Zaretsky, William J. Anderson, and Richard J. Parker. Oct 62, 42p. 32 refs. Technical note D-1404.

NASA N62-16101 $1.00

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
VAPORIZATION RATES OF ETHANOL SPRAYS IN A COMBUSTOR WITH LOW-FREQUENCY FLUCTUATIONS OF COMBUSTION-GAS PRESSURE, by Robert D. Ingebo. Oct 62, 35p. 5 refs. Technical note D-1408.

MATHEMATICS

AD-279 693 $5.60

Adelphi Coll. [Garden City, N. Y.]
A NECESSARY AND SUFFICIENT CONDITION FOR STABILITY OF DIFFERENCE SCHEMES FOR SECOND-ORDER INITIAL VALUE PROBLEMS, by Mary Louise Buchanan. Rept. on Contract Nonr-3360(01). Feb 62, 58p. 7 refs. AGM rept. no. 104.

DESCRIPTORS: *Operators (Mathematics), *Partial differential equations, Matrix algebra, *Difference equations, Complex numbers, Functions, Operational calculus, Stability.

This paper is concerned with the stability of difference schemes for second order initial value problems, with constant coefficients.

TID-11054 $1.10

Knolls Atomic Power Lab., Schenectady, N. Y.
A REMARK ON THE PROPAGATION OF ERROR, by M. Halperin. [1961] 6p.

TID-15780 $1.10

Sandia Corp., Albuquerque, N. Mex.
THE PRECOMPILER - A PROGRAM WHICH WILL ALLOW ARBITRARY ARITHMETIC MODES IN FORTRAN PROGRAMS, by C. M. Williams. Rept. on Contract AT(29-1)-789. 8 May 62, 5p. SCDC-2673.

NASA N62-15876 $6.60

Geophysics Corp. of America, Bedford, Mass.
DEVELOPMENT OF COLD CATHODE IONIZATION GAUGES FOR THE MEASUREMENT OF LOW PRESSURES, by W. S. Kreisman and R. Herzog. Rept. on Contract NAS5-270. Nov 61, 68p. 15 refs. GCA Technical rept. 61-18-N.

NASA N62-15877 $8.10

Geophysics Corp. of America, Bedford, Mass.
VACUUM GAUGE CALIBRATION SYSTEM, by W. S. Kreisman. Rept. on Contract NAS5-270. Dec 61, 83p. 9 refs. GCA Technical rept. 61-19-N.

NASA N62-16295 $0.75

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
OPTICAL TORQUEMETER FOR HIGH ROTATIONAL SPEEDS, by Alois Krsek, Jr. and Marvin Tiefermann. Oct 62, 23p. 1 ref. Technical note D-1437.

AD-279 125 $3.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
CURVATURE OF AN INTERNALLY PRESSURIZED CIRCULAR CYLINDRICAL MEMBRANE UNDER PURE BENDING, by W. E. Jahsman. Rept. on Inflatable Space Structures. Jan 62, 33p. 4 refs. Rept. no. 6-90-62-4.

DESCRIPTORS: *Membranes, *Cylindrical bodies, Structures, Pressure, Elasticity, Stresses, Deflection, Load distribution, Buckling, Pressurized cabins, Experimental data, Tables, Mechanical properties.

A theoretical and experimental study has been performed to determine the moment-curvature relation for an internally pressurized circular cylindrical membrane. The thickness of the membrane is such that the wall cannot support compressive stress so that the theoretical moment-curvature curve becomes nonlinear when the bending stress exceeds the longitudinal pressure stress. Experimental data generally tend to confirm the theoretical results, although premature buckling is observed at the lower values of internal pressure. (Author)

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Office of Naval Research, Washington, D. C.
SYMPOSIUM ON NAVAL HYDRODYNAMICS [NO. 3]. HIGH-PERFORMANCE SHIPS, SPONSORED BY THE OFFICE OF NAVAL RESEARCH AND THE NETHERLANDS SHIP MODEL BASIN, SEPTEMBER 19-22, 1960, SCHEVENINGEN, NETHERLANDS, ed. by Stanley W. Doroff. May 62, 632p. 168 refs. ONR/ACR-65.

DESCRIPTORS: *Symposia, Naval research, *Hydrodynamics, Ships, *Naval vessels, Design, Marine propellers, Cycloidal propellers, Propeller blades, Ship hulls, Hydrofoil boats, Hydrofoils, Cavitation, Ground-effect machines, Submarines, Oceanographic vessels, Cargo ships, Tankers, Laminar boundary layer, Fluid flow, Ship plates, Water waves.

Contents:
High performance ships-promises and problems; Size, type, and speed of ships in the future; On the efficiency of a vertical-axis propeller; A solution of the minimum wave resistance problem; On the problem of minimum wave resistance for struts and strut-like dipole distributions; The hydrodynamics of high-speed hydrofoil craft; On hydrofoils running near a free surface; The effect of size on the seaworthiness of hydrofoil craft; Design and initial test of ONR supercavitating hydrofoil boat XCH-6; Design and operating problems of commercial hydrofoils; Ground effect machine research and development in the United States; Hydrodynamic aspects of a deep-diving oceanographic submarine; Submarine cargo ships and tankers; Experimental techniques and methods of analysis used in submerged body research; A theory of the stability of laminar flow along compliant plates; The french bathyscaph program; A method for a more precise computation of heaving and pitching motions both in smooth water and in waves; Semisubmerged ships for high-speed operation in rough seas; Design data for high speed displacement-type hulls and a comparison with hydrofoil craft.

Aerodynamics and Pneumatics

NASA N62-16299 $1.25

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
A 1-FOOT HYPERVELOCITY SHOCK TUNNEL IN WHICH HIGH-ENTHALPY, REAL-GAS AIR FLOWS CAN BE GENERATED WITH FLOW TIMES OF ABOUT 180 MILLISECONDS, by Bernard E. Cunningham and Samuel Kraus. Oct 62, 43p. 20 refs. Technical note D-1428.

NASA N62-16011 $1.00

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
COMPARISON OF EXPERIMENTAL AND NUMERICAL RESULTS FOR THE FLOW OF A PERFECT GAS ABOUT BLUNT-NOSED BODIES, by Mamoru Inouye and Harvard Lomax. Sep 62, 41p. 16 refs. Technical note D-1426.

NASA N62-17745 $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
EFFECTS OF LEADING-EDGE BLUNTNESS ON FLUTTER CHARACTERISTICS OF SOME SQUARE-PLANFORM DOUBLE-WEDGE AIRFOILS AT A MACH NUMBER OF 15.4, by Robert C. Goetz. Oct 62, 27p. 8 refs. Technical note D-1487.

NASA N62-16855 $0.75

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
FREE-FLIGHT TESTS OF FIFTH-STAGE SCOUT ENTRY VEHICLE AT MACH NUMBERS OF 5 AND 17, by Donn B. Kirk and Robert J. Miller. Oct 62, 28p. 9 refs. Technical note D-1425.

NASA N62-16856 $0.50

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
LONGITUDINAL TRIM CHARACTERISTICS OF A DEFLECTED SLIPSTREAM V/STOL AIRCRAFT DURING LEVEL FLIGHT AT TRANSITION FLIGHT SPEEDS, by Howard L. Turner and Fred J. Drinkwater III. Oct 62, 20p. 2 refs. Technical note D-1430.

NASA N62-17377 $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
STABILITY INVESTIGATION OF A BLUNTED CONE AND A BLUNTED OGIVE WITH A FLARED CYLINDER AFTERBODY AT MACH NUMBERS FROM 0.30 TO 2.85, by Lucille C. Coltrane. Oct 62, 28p. 7 refs. Technical note D-1506; supersedes NASA TM X-199.

AD-279 094 $2.60

AVCO-Everett Research Lab., Mass.
COMPARISON BETWEEN THEORY AND FLIGHT ABLATION DATA, by Henry Hidalgo and Leo P. Kadanoff. Rept. on Contract AF 04(647)278. Aug 59, 25p. 6 refs. Research rept. 118; AFBMD-TN-59-16; NASA N62-10133.

DESCRIPTORS: *Ablation, Theory, *Guided missile noses, Flight testing, *Aerodynamic heating, *Quartz, Radiation effects, Thermal radiation, Viscosity, Turbulent flow, Laminar boundary layer.

A previous paper presented an approximate theory for the ablation of glassy materials under both laminar and turbulent heating conditions. This paper evaluates the theory by using data that was obtained from a full scale flight experiment with an ICBM nose cone similar to the one previously described. The measurements of the ablated distance around the surface of the recovered nose cone are compared with the corresponding values from the ablation theory. Excellent agreement between theory and experiment is obtained. For example, the maximum actual ablated distance is only 9% higher than the corresponding theoretical value. Also, the predictions for the total weight loss from the spherical cap and conical section of the nose cone, and the total weight of material that recondenses on the cylinder agree with the flight values to within 20%. It is therefore concluded that the ablation of quartz under both laminar and turbulent heating is well understood. (Author)

AD-279 943 $5.60

Institute of Aerophysics, U. of Toronto (Canada).
INVESTIGATION OF THE OSCILLATORY DERIVATIVES OF AN AEROFOIL WITH FLAPS OSCILLATING AT NEGATIVE ANGLES OF ATTACK, by G. Kurylowich. Oct 61, 53p. 1 ref. UTIA Technical note no. 55.

DESCRIPTORS: *Airfoils, *Flaps, Oscillation, Wings, *Aerodynamics, Model tests, Flutter, Lift, Moments, Elasticity, Subsonic flow, Calibration, Angle of attack

Measurements have been made of the lift and pitching moment on a two dimensional wing oscillating in pitch about an axis on the chord line. The wing was fitted with nose and trailing-edge flaps and it was found that in the range $-8^{\circ} \leq \alpha \leq 0^{\circ}$, there were large changes in all the derivatives. The damping in pitch became negative and, since there is still a positive lift coefficient in this range, there exists the possibility of one-degree-of-freedom flutter, in a practical case. (Author)

NASA N62-16837 $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
EXPERIMENTAL INVESTIGATION OF THE EFFECTS OF COMPRESSIVE STRESS ON THE FLUTTER OF A CURVED PANEL AND A FLAT PANEL AT SUPERSONIC MACH NUMBERS, by Robert W. Hess and Frederick W. Gibson. Oct 62, 29p. 7 refs. Technical note D-1386.

NASA N62-16296 $1.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
LOW-SPEED STATIC LONGITUDINAL AND LATERAL AERODYNAMIC CHARACTERISTICS OF A MODEL WITH A LOW-ASPECT-RATIO VARIABLE-INCIDENCE WING AND WITH A FREE-FLOATING AND A PROGRAMED HIGH-LIFT CANARD CONTROL, by William I. Scallion. Oct 62, 65p. 2 refs. Technical note D-1381.

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Langley Research Center, National Aeronautics and Space Administration, Langley [Station] Va.
MEASUREMENTS OF THE DISSOCIATION RATE OF MOLECULAR OXYGEN, by Charles J. Schexnayder, Jr. and John S. Evans. 1961, 21p. 32 refs. NASA Technical rept. R-108; N62-16074.

DESCRIPTORS: Dissociation, Gas flow, *Oxygen, High temperature research, *Shock waves, Tests, Density, *Superaerodynamics, Shock tubes, Mathematical analysis, Argon, Molecules, Ultraviolet radiation.

The ability of molecular oxygen to absorb light in the Schumann-Runge ultraviolet region of the spectrum has been used to follow the change in concentration of molecular oxygen as a function of time behind shock waves in oxygen and in a mixture of 10-percent oxygen in argon. Analysis of the records obtained yielded values for the dissociation rate of oxygen as a function of temperature over the range $4,000^{\circ}$ to $10,000^{\circ}$ K. The highest previously reported experimental results in the literature were at $7,500^{\circ}$ K. (Author)

AD-279 853 $1.60

National Research Council of Canada. Div. of Mechanical Engineering, Ottawa (Canada).
EXPERIMENTAL LIGHTWEIGHT HIGH TEMPERATURE DUCTING, by B. Quan. Oct 61, 12p. Aeronautical rept. LR-322; NRC no. 6713.

DESCRIPTORS: *Duct inlets, Design, Tests, *Vertical take-off planes.

An experimental lightweight ducting weighing approximately one-half of that used in conventional tailpipe practice was subjected to high temperature gases. Tests on a 16-inch diameter section indicate that this design is basically sound and may be owthy of development. This design is also adaptable to varying crosssections or curved members such as volutes. (Author)

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Naval Weapons Lab., Dahlgren, Va.
AN ASYMPTOTIC REPRESENTATION OF SUPERSONIC FLOWS PAST BODIES OF REVOLUTION, by E. W. Schwiderski. 20 Mar 62, 19p. 3 refs. NWL rept. no. 1795; NASA N62-10824.

DESCRIPTORS: *Bodies of revolution, Aerodynamic configurations, Supersonics, *Supersonic flow, Transonic flow, Shock waves, Aerodynamics, Numerical analysis, Integrals, Differential equations, Integration.

A two-term asymptotic representation of a purely or non-purely supersonic flow past an axisymmetric body of finite dimensions is constructed between the shock wave and the limiting characteristic. This characteristic forms the downstream portion of the boundary of the transonic flow which depends on the shape of the shock wave. The two terms of the asymptotic integral are significant for the numerical construction of the entire transonic flow. (Author)

AD-279 443 $2.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
FLOW THROUGH AN OBLIQUE SHOCK WAVE WITH VARYING DEGREES OF RELAXATION IMMEDIATELY DOWNSTREAM, by J. D. Cresswell. Rept. on Shock Wave Analysis, Contract AF 04(647)269. Mar 62, 24p. Technical Information Series R62SD19; NASA N62-10449

DESCRIPTORS: *Shock waves, Analysis, *Gas flow, Molecular rotation, Excitation, Vibration, Chemical equilibrium, Thermodynamics, Relaxation time.

Flow conditions immediately downstream of an oblique shock are calculated for three degrees of relaxation, namely: (1) full excitation of molecule translation and rotation, no other types of energy present; (2) equilibrium excitation of translation, rotation, and vibration with no other modes of energy present; and (3) complete thermodynamic and chemical equilibrium. Results are compared for a typical flight condition. A method of computation for case 2 is presented. This method would find application in analysis of shock layer flow fields in which chemical kinetics (non-equilibrium) are considered. (Author)

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Vertol Div., Boeing Co. [Morton, Pa.]
A REVIEW OF THEORETICAL AND EXPERIMENTAL INVESTIGATIONS OF THE ROTOR AERODYNAMIC PROBLEM, by R. G. Loewy, D. J. Smyers, and R. Gabel. Rept. on Contract Nonr-2811(00). Oct 60, 113p. 170 refs. Rept. no. R-217; NASA N62-11462.

DESCRIPTORS: *Rotor blades, *Aerodynamics, *Bibliography, Moments, Deflection, Vibration, Pressure, Load distribution, Downwash, Theory, Experimental data.

The current literature on the problem of lifting rotor airloads is categorized and listed in several useful arrangements and some of the more important papers are reviewed and/or summarized. A new and comprehensive attack on the problem is outlined.

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Aerojet-General Nucleonics, San Ramon, Calif.
EFFECTS OF GAS CORROSION AND AGING ON ML-1 TURBINE ALLOYS, by B. E. Farwell and J. S. Brunhouse. Rept. on Army Gas-Cooled Reactor Systems Program, Contract AT(10-1)-880. Aug 62, 37p. NASA N62-15944.

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Knolls Atomic Power Lab., Schenectady, N. Y.
THE EFFECT OF COMPOSITION AND HEAT TREATMENT ON THE TENSILE PROPERTIES OF SOME ZIRCONIUM BASE ALLOYS, by F. W. Kunz and D. L. Douglass. Rept. on Contract W-31-109-eng-52. 21 June 60, 45p. 7 refs.

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Materials Science Center, Cornell U., Ithaca, N. Y.
BORDONI PEAKS IN ALUMINUM, by Donald Louis Ameen. Rept. on Contract AT(30-1)-2471. June 62, 54p. 18 refs. Rept. no. 50.

TID-15356 $4.60

Metallurgical Research Labs., Syracuse U. Research Inst., N. Y.
A REVIEW OF EQUIPMENT HAVING CAPABILITIES FOR LOW CYCLE FATIGUE TESTS, by A. P. Taber and W. W. Gerberich. Interim technical rept. no. 2 on Contract AT(30-1)-2141. 19 Sep 58, 39p. 6 refs. MET575-589IT.

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

ANL-6587 $1.25

Argonne National Lab., Ill.
PHYSICS ANALYSIS OF THE JUGGERNAUT REACTOR, by D. P. Moon. Rept. on Contract W-31-109-eng-38. July 62, 47p. 12 refs.

WAPD-TM-331 $0.75

Bettis Atomic Power Lab., Pittsburgh, Pa.
CALCULATION OF THE CONCENTRATIONS AND FISSIONS OF HEAVY ISOTOPES IN TIME-VARYING IRRADIATIONS OF URANIUM AND PLUTONIUM, by J. C. Connor. Rept. on Contract AT(11-1)-GEN-14. May 62, 27p. 7 refs.

AD-281 677 $1.10

David Taylor Model Basin, Washington, D. C.
THERMAL ENERGY TRANSPORT CODE TET, by Charles W. Dawson. Apr 62, 6p. 1 ref. Rept. 1613.

DESCRIPTORS: Neutrons, *Thermal neutrons, Energy, *Transport properties, Diffusion, Neutron flux density, *Mathematical computer data, *Coding, Programming.

This report describes the thermal energy transport code TET, a 39-group slab-geometry transport code designed for the solution of thermal problems. The programming was done in FORTRAN so that TET can be run on an IBM 704 system or on a Philco TRANSAC. (Author)

TID-16059 $9.60

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AVERAGE RESONANCE PARAMETERS NEAR A = 100, by Aaron Keith Furr. Thesis. 1962. 116p. 55 refs.

GAMD-680 $1.10

General Atomic Div., General Dynamics Corp., San Diego, Calif.
THE CALCULATION OF MONATOMIC GAS SCATTERING KERNELS, by J. Gauer. 17 Feb 59, 7p. 3 refs.

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HYPERON PRODUCTION BY K- INTERACTIONS IN DEUTERIUM, by Orin Iver Dahl. Doctoral thesis. Rept. on Contract W-7405-eng-48. 3 July 62, 68p. 20 refs.

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PHYSICS DIVISION. Semiannual rept., Nov 61-Apr 62, on Contract W-7405-eng-48. 17 May 62, 82p. 68 refs.

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ELECTRONUCLEAR DIVISION. Annual progress rept. for period ending 31 Dec 61, on Contract W-7405-eng-26. [1962] 78p. 66 refs. NASA N62-14946.

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A DOUBLE GAMMA-RAY SPECTROMETER TO SEARCH FOR POSITRONS IN SPACE, by Thomas L. Cline, Peter Serlemitsos, and Edward W. Hones, Jr. (Inst. for Defense Analyses) Oct 62, 13p. 4 refs. Technical note D-1464.

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ATOMIC ENERGY COMMISSION REPORTS. VOLUME I OPINIONS AND DECISIONS OF THE ATOMIC ENERGY COMMISSION WITH SELECTED ORDERS, OCTOBER 8, 1956, TO DECEMBER 31, 1961. 1962, 1022p.

DESCRIPTORS: Atomic energy, *Atomic energy engineering, *Legislative liaison.

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Atomic Energy Commission. Div. of Operations Analysis and Forecasting, Washington, D. C.
FORTRAN PROGRAM FOR COMPUTING U-235 SCHEDULES FROM ASSUMED REACTOR PARAMETERS, by Edwin H. Davidson. Aug 62, 43p. OA:R-27.

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NASA N62-16010 $1.25

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
REACTOR-WEIGHT STUDY OF BERYLLIUM OXIDE, BERYLLIUM, LITHIUM-7 HYDRIDE, AND WATER AS MODERATORS WITH TUNGSTEN 184 STRUCTURAL MATERIAL AND URANIUM DIOXIDE FUEL, by Robert E. Hyland. Sep 62, 42p. 11 refs. NASA TN D-1407.

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H4LM GRAPHITE, by R.G. Merryman, P. Wagner, and D.P. MacMillan. Rept. on Contract W-7405-eng-36. 5 Sep 62, 89p. NASA N62-15577.

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SPERT PROJECT. Quarterly technical rept. Jan-Mar 62, on Contract AT(10-1)-205. 10 Aug 62, 28p. 8 refs.

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PROCESSING OF POWER REACTOR FUELS, comp. by J. Harding Owen. Quarterly progress rept. no. 19, 1 Apr-1 July 62, on Contract AT(07-2)-1. Aug 62, 14p. 5 refs.

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AIRBLAST OVERPRESSURE AND DYNAMIC PRESSURE OVER VARIOUS SURFACES, by D. C. Sachs, L. M. Swift, and F. M. Sauer. Rept. for Feb-May 55, on Operation Teapot. 9 Sep 57, declassified 24 Nov 61. 191p. 24 refs.

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A REVIEW OF ANALYTICAL AND EXPERIMENTAL WORK PERTINENT TO THE DOPPLER EFFECT IN FAST REACTORS, by Charles C. Graves. Rept. on Contract AT(30-1)-2832. 31 Aug 62, 62p. 66 refs.

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TID-15817 $5.60

Institute of Nuclear Sciences, Private Bag, Lower Hutt (New Zealand)
THE DEPOSITION OF RADIO, STRONTIUM, CAESIUM, AND BARIUM IN EVERY RAIN AT GRACEFIELD, LOWER HUTT, NEW ZEALAND, by G. S. McNaughton and R. N. Woodward. Final rept. May 59-Sep 61, on Contract AT(30-1)-2167. Oct 61, 60p. 24 refs. INS-R-13.

NASA N62-16298 $0.75

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
A FORTRAN II PROGRAM FOR ANALYSIS OF RADIOACTIVE DECAY CURVES, by John L. Need and Theodore E. Fessler. Oct 62, 24p. 6 refs. Technical note D-1453.

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Geological Survey, Washington, D. C.
SUMMARY OF ROCK SALT DEPOSITS IN THE UNITED STATES AS POSSIBLE STORAGE SITES FOR RADIOACTIVE WASTE MATERIALS, by W. G. Pierce and E. I. Rich. 1962, 96p. 203 refs. Geological Survey bulletin 1148.

DESCRIPTORS: Radioactive waste, Storage, *Radioactive waste disposal, Rock, Salts, Deposits, *Geology, Geological survey.

ORNL-2971(Vol. 8) $2.00

Oak Ridge National Lab., Tenn.
BIBLIOGRAPHY ON NUCLEAR REACTOR FUEL REPROCESSING AND WASTE DISPOSAL. VOLUME 8. WASTE TREATMENT AND DISPOSAL, by T. F. Connolly. Rept. on Contract W-7405-eng-26. [1962] 86p.

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Naval Supply Research and Development Facility, Bayonne, N. J.
DESIGN AND EVALUATION OF A MULTI-STRETCH COVERALL FOR FBM SUBMARINE CREWMEN, by Seymour Lash. Mar 62, 24p. Clothing and Textile Division rept. no. 63.

DESCRIPTORS: *Submarine personnel, *Clothing, Design, *Cotton cellulose, *Cotton textiles, Synthetic fibers.

The prolonged patrols of the Polaris submarines presented, among other problems, shipboard clothing storage and laundering difficulties. Based upon personal equipment spaces allocated per man on the submarine it would be impossible for him to carry more than a few weeks supply of conventional clothing. This report covers the design and evaluation of a family of clothing items, consisting of a multi-sized stretch coverall, undershirt, drawers, and socks made from fabrics containing a blend of cotton and hydrophobic fibers which are both functional in a submarine environment and can be laundered and ready for wear in a few hours without putting a burden on the ship's limited laundry facilities.

AD-280 191 $1.60

Naval Supply Research and Development Facility, Bayonne, N. J.
DEVELOPMENT AND EVALUATION OF AN ABANDON-SHIP IMMERSION SUIT, by Francis S. Andruk. Jan 62, 16p. 4 refs. Clothing and Textile Division rept. no. 48.

DESCRIPTORS: Naval personnel, *Survival, Sea rescue equipment, *Protective clothing, *Exposure suits, Underwater clothing, Slide fasteners, Design, Tests, *Clothing.

Various stages in the development and evaluation of an "abandon-ship" type immersion suit are discussed. Results of an operational evaluation on the final prototype designed indicated that the suit would be acceptable for peacetime use with minor modifications. Also discussed are recommendations that further design of a (Personnel Supplies and Personal Equipment, 20 Jan 63) suit for peacetime use be discontinued and that future work be directed towards the development of a multipurpose continuous-wear suit for wartime use. Comments on the practicability of a single use abandon-ship type suit as compared to a multipurpose continuous-wear suit are included. (Author)

AD-280 835 $1.60

Naval Supply Research and Development Facility, Bayonne, N. J.
DEVELOPMENT OF A RUBBER INSULATED BOOT FOR USE IN INTERMEDIATE COLD WEATHER, by Arthur Price. Feb 62, 19p. 6 refs. Clothing and Textile Division rept. no. 53.

DESCRIPTORS: Naval personnel, *Protective clothing, *Shoes, Design, Tests, *Clothing, Rubber.

This report discusses the development of an intermediate cold weather rubber insulated boot employing the double-moisture-barrier principle of sealed insulation. The boot was principally designed to provide protection to shipboard personnel operating in climatic zones III through VI, for ambient temperatures down to -10°F; however, this boot can also be used by shore-based personnel. The report reviews and discusses (Personnel Supplies and Personal Equipment, 20 Jan 63) early prototypes, their shortcomings, and design and construction changes made for improvement. Subjective information obtained during various service evaluations is summarized. (Author)

AD-280 834 $2.60

Naval Supply Research and Development Facility, Bayonne, N. J.
DEVELOPMENT OF ALTERNATES FOR COATED 3.5 OUNCE NYLON TWILL, by Jack Naimer and Robert Briganti. Feb 62, 22p. 5 refs. Clothing and Textile Division rept. no. 51.

DESCRIPTORS: Textiles, *Nylon, *Rayon, *Substitutes, Synthetic rubber, Coatings, Clothing.

A program was initiated to develop suitable alternates for a 3.5-ounce low textured nylon base fabric used for coating with neoprene. The objective was to provide information on the use of alternate fiber materials should

nylon be in short supply under mobilization conditions. Fabrics were designed to simulate the character of the standard nylon fabric using Fortisan and high tenacity viscose yarns. Cotton airplane cloth was used as a (Personnel Supplies and Personal Equipment, 20 Jan 63) control. Flame-retardant neoprene, as well as regular neoprene, was used as a coating compound in order to improve the flammability characteristics of the coated fabric. The coated fabrics were subjected to a laboratory evaluation and analysis including standard tests for strength factors, waterproofness, stiffness, and flammability. (Author)

AD-280 193 $2.60

Naval Supply Research and Development Facility, Bayonne, N. J.
DEVELOPMENT OF RASCHEL WAFFLE KNIT FABRICS FOR NAVY COLD WEATHER CLOTHING, by Lionel Weinstock. Feb 62, 22p. 16 refs. Clothing and Textile Division rept. no. 50.

DESCRIPTORS: *Underwear, Climatic factors, *Exposure, Clothing, Materials, *Textiles, Design.

The background and history of the development of a 2-bar Raschel knit cotton waffle underwear fabric are discussed. An alternate, tighter 3-bar Raschel waffle construction is described. Both fabrics were evaluated in the laboratory in comparison to the former standard wool/cotton underwear fabric. Modifications to the 2-bar waffle underwear patterns and a revised size range are also discussed in relation to improved garment fit. (Author)

AD-281 243 $1.60

Naval Supply Research and Development Facility, Bayonne, N. J.
FURTHER STUDIES ON THE SHELF LIFE OF NEOPRENE COATED NYLON FABRICS, by Robert Briganti. Mar 62, 20p. 3 refs. Clothing and Textile Division rept no. 61.

DESCRIPTORS: *Textiles, *Nylon, *Synthetic rubber, Coatings, Clothing, Storage, Physical properties, Deterioration.

Previous work had shown that neoprene coated nylon fabrics could be safely stored for periods of at least 3 years. A new study was conducted to evaluate these materials after a considerably longer storage period. A total of 9 single coated and 8 double coated fabrics which had been in storage for periods of 6 to 10 years were selected for evaluation. For purposes of comparison 2 samples of nylon coated with Buna-N were also included. The coated fabrics were evaluated for pertinent physical properties; the resultant values were compared with similar pre-storage data to indicate the nature and extent of deterioration. (Author)

AD-281 242 $2.60

Naval Supply Research and Development Facility, Bayonne, N. J.
INVESTIGATION OF REPRESENTATIVE CIRCULAR KNIT COMMERCIAL UNDERWEAR FABRICS, by Lionel Weinstock. Mar 62, 21p. 7 refs. Clothing and Textile Division rept. no. 65.

DESCRIPTORS: *Underwear, Climatic factors, *Exposure, Clothing, Materials, Tests, *Textiles.

An evaluation was conducted to compare commercially available cold weather underwear fabrics with the present Navy Raschel knit cotton fabric. Included in the study were nine all cotton and one cotton/Dynel circular knit waffle fabrics, five wool and wool/cotton blend jersey or rib knits, and three two-layer wool blend types. These fabrics were compared to the Raschel fabric for warmth efficiency, stretch and recovery, and laundering stability properties. (Author)

AD-281 240 $3.60

Naval Supply Research and Development Facility, Bayonne, N. J.
A NEW SYSTEM FOR EVALUATION OF SHOE UPPER LEATHER BY DIMENSIONAL ATTRIBUTES, by Milton Bailey. Mar 62, 31p. 13 refs. Clothing and Textile Division rept. no. 64.

DESCRIPTORS: *Leather, Test methods, Standards, *Shoes, Quality control, Clothing.

The current method of scoring visual leather defects by personal opinion results in the acceptance of undesirable non-uniform, poor quality shoe upper leather. Indefinite criteria based on personal standards defeat the purpose of statistical quality control and compromise inspection procedures. Consequently, a system was developed that labeled defects and assigned quantitative linear or surface measurements to replace prevailing subjective (Personnel Supplies and Personal Equipment, 20 Jan 63) standards. The system permits objective scoring and verification of poor shoe upper leather characteristics and may be used by anyone, including inexperienced personnel. Cut shoe parts (vamps, quarters, etc.) rather than skins or sides are used as units of inspection. An initial test of the system using a sampling representative of 30,000 pairs of shoes showed that the method of the standard was quick, inexpensive, definitive, and maintained the quality of leather desired in the footwear.

AD-281 244 $1.60

Naval Supply Research and Development Facility, Bayonne, N. J.
SERVICE EVALUATION OF EXPERIMENTAL CIRCULAR KNIT WAFFLE TYPE WEATHER UNDERWEAR, by Sam Corona. Mar 62, 18p. 3 refs. Clothing and Textile Division rept. no. 60.

DESCRIPTORS: *Underwear, Acceptability, Clothing, Materials, Climatic factors, *Exposure, Textiles, Thermal insulation.

A service evaluation was conducted to compare the warmth, comfort, and functional properties of two experimental circular knit waffle underwear against the standard 100% cotton Raschel knit waffle underwear presently used by the Navy. Results showed the experimental all cotton circular knit waffle to be comparable in most respects to the present standard and to be suitable for service use. (Author)

Order from GPO $0.30 as
NAS 1.12:121

Langley Research Center, National Aeronautics and Space Administration, Langley [Station] Va.
A THEORETICAL STUDY OF THE MOTION OF AN IDEALIZED PLASMA RING UNDER THE INFLUENCE OF VARIOUS COAXIAL MAGNETIC FIELDS, by Clarence W. Matthews. 1961, 20p. 6 refs. NASA Technical rept. R-121.

DESCRIPTORS: *Plasma physics, Plasma jets, Motion, Velocity, *Magnetohydrodynamics, Theory, *Transformers, Magnetic fields, Electric arcs.

The motion of an idealized plasma ring under the influence of either or both steady and alternating magnetic fields is studied to determine the pertinent parameters and phenomena involved. The results show the velocities attainable in induced-electromotive-force accelerators and indicate various conditions which should be favorable for the operation of such accelerators. (Author)

PB 159 532 $1.10

Microwave Lab., Stanford U., Calif.
AN INVESTIGATION OF RF INTERACTION WITH SLOW-MOVING ELECTRONS WITHOUT THE USE OF A PERIODIC CIRCUIT, by R. H. Pantell, K. K. Chow, and T. P. Lee. Annual rept. Nov 60-Nov 61, on National Science Foundation Grant 15011. Dec 61, 7p. 3 refs. M. L. rept. no. 871.

DESCRIPTORS: *Cyclotrons, *Electron guns, *Electron beams, Electromagnetic waves, *Microwaves, Wave transmission, Radiofrequency oscillators, Resonance, Waveguides, Magnetic fields, Power supplies.

The purpose of this project is to investigate the feasibility of obtaining coherent radiation from the interaction between a slow-moving electron beam and an electromagnetic wave propagating at faster than the velocity of light. This investigation is important as a possible means for generating electromagnetic energy at wavelengths of one millimeter or shorter. Millimeter waves can be used as a diagnostic tool for studying resonance phenomena in solids, for probing high density plasmas, and perhaps for communication in outer space.

Order from GPO $0.30 as
C 13.44:99

National Bureau of Standards, Boulder, Colo.
A SURVEY OF THE TECHNIQUES FOR MEASURING THE RADIO REFRACTIVE INDEX, by R. E. McGavin. May 62, 41p. 26 refs. Technical note 99.

DESCRIPTORS: *Radio waves, *Propagation, *Refractive index, Measurement, *Refractometers, Radiofrequency, Microwave equipment.

The radio refractive index can be measured either directly or indirectly. The former method is utilized by radio frequency refractometers; the latter method involves measurement of temperature, pressure and humidity and conversion to refractive index. In terms of convenience and accuracy the direct method is superior; however, lack of the universal use of refractometers requires the use of weather service type of data for the bulk of refractive index structures. Meteorological sensing is limited mainly by the inaccuracy in measuring humidity which under ideal conditions appears to limit the accuracy to 1.0 N. Gradient measurements utilizing radiosondes reflects an accuracy no better than ± 3 N units. Radio frequency refractometers are capable of accuracies as much as an order of magnitude better than that achieved by meteorological sensors. Lightweight refractometers have been devised for balloon-borne and dropsonde measurements reflecting accuracies inferior to the conventional refractometer but superior to the radiosonde. (Author)

Order from GPO $2.75 as
C 13.44:49

National Bureau of Standards, Washington, D. C.
TABLES OF EINSTEIN FUNCTIONS. VIBRATIONAL CONTRIBUTIONS TO THE THERMODYNAMIC FUNCTIONS, by Joseph Hilsenrath and Guy G. Ziegler. 12 July 62, 265p. 12 refs. NBS Monograph 49.

DESCRIPTORS: *Tables, *Thermodynamics, Functions, Gases, Energy, Enthalpy, Entropy, Heat tolerance, *Harmonic oscillators, Oscillators.

This Monograph is one in a series of publications presenting definitive thermodynamic data of interest in pure and applied science and in technology. The tables of Einstein functions should be useful in estimating the thermodynamic properties of polyatomic gases at high and low temperature, as well as the heat conductivity and electrical conductivity of solids.

AD-281 218 $1.10

Navy Underwater Sound Reference Lab., Orlando, Fla.
CALIBRATION OF A HYDROPHONE BY THE SIMULTANEOUS COMPARISON CALIBRATION METHOD, by Harold Dennis. 14 June 62, 8p. USRL Research rept. no. 62.

DESCRIPTORS: *Hydrophones, Calibration, Instrumentation

A method is described whereby any type of hydrophone may be calibrated by comparing its output voltage with that of a standard hydrophone when the two are subjected to the same sound field. The advantage lies in the ease and freedom from human error with which a final calibration may be obtained from the data recorded. The method is most advantageous when used with automatic transmission measuring equipment such as is used at USRL. Limitations lie in the allowable size and placement of the hydrophones and projector in order to maintain practical free-field conditions. Refinement of the method was not completed because its advantages were obtained by another approach. (Author)

NASA N62-14858 $2.60

New Hampshire U., Durham.
THE BOUNDARY OF THE GEOMAGNETIC FIELD, by L. J. Cahill and P. G. Amazeen. Rept. on Contract NASw-155. June 62, 26p. 25 refs. UNH-62-1.

Molecular Physics and Spectroscopy

BNL-6050 $1.10

Brookhaven National Lab., Upton, N. Y.
ISOTOPE EFFECTS ON INTERMOLECULAR INTERACTIONS AND ISOTOPIC VAPOR PRESSURE DIFFERENCES, by Max Wolfsberg. Rept. on Contract AT(30-2)-Gen-16. [1961] 4p.

TID-16464 $1.60

Institute of Metals and Explosives Research, U. of Utah, Salt Lake City.
INFRARED IDENTIFICATION OF SILICA ADSORBED ON THORIA SURFACES, by Jong S. Cho and Milton E. Wadsworth. Technical rept. no. 16 on Subcontract to Contract W-7405-eng-26. 15 May 62, 18p. 11 refs.

TID-16465 $1.60

Institute of Metals and Explosives Research, U. of Utah, Salt Lake City.
AN INFRARED STUDY OF HYDRATED THORIUM NITRATE, by Jong S. Cho and Milton E. Wadsworth. Technical rept. no. 18 on Subcontract to Contract W-7405-eng-26. 15 May 62, 13p. 10 refs.

TID-15918 $1.60

Institute of Metals and Explosives Research, U. of Utah, Salt Lake City.
A NOVEL HIGH TEMPERATURE INFRA-RED CELL, by F. A. Olson and G. C. Anderson. Technical rept. no. 3 on Contract W-7405-Eng-26, Subcontract 3003. 30 Apr 62, 15p.

NASA N62-17645 $1.75

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
CALCULATION OF TRANSPORT PROPERTIES AND HEAT-TRANSFER PARAMETERS OF DISSOCIATING HYDROGEN, by Norman T. Grier. Oct 62, 65p. 24 refs. Technical note D-1406.

NASA N62-16012 $1.25

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
EXPERIMENTAL DETERMINATION OF SPECTRAL AND TOTAL TRANSMISSIVITIES OF CLOUDS OF SMALL PARTICLES, by Chester D. Lanzo and Robert G. Ragsdale. Sep 62, 41p. 11 refs. Technical note D-1405.

TID-16477 $10.10

Michigan U. Coll. of Literature, Science and the Arts, Ann Arbor.
VELOCITY DEPENDENCE OF THE DIFFERENTIAL CROSS SECTIONS, AND POTENTIAL WELL DEPTHS FROM ATOMIC BEAM SCATTERING MEASUREMENTS: K-Hg AND Cs-Hg SYSTEMS, by Frederick A. Morse and Richard B. Bernstein. Technical rept. on Contract AT(11-1)-321. June 62, 130p. 60 refs. 03043-4-T.

Optics

PB 162 406 $1.10

Laboratory of Neurophysiology, National Institutes of Health, Bethesda, Md.
AN UNIDIMENSTIONAL OPTICAL SYSTEM, by John Joseph Lewis. Invention rept. 14 Apr 61, 4p. 4 refs.

DESCRIPTORS: *Optical systems, *Lenses, Design.

This is a new lens system with which to enlarge or reduce in one dimension only, and without distortion or other aberrations.

LAMS-2734 $0.50

Los Alamos Scientific Lab., N. Mex.
PULSED RUBY LASER FOR PLASMA INTERFEROMETRY, by D. E. Nagle, A. S. Rawcliffe and others. Rept. on Contract W-7405-eng-36. 11 Sep 62, 26p. 3 refs. NASA N62-15636.

Solid State Physics

AD-281 233 $1.10

Arizona U., Tucson.
DIFFUSION IN Ag-Zn SYSTEMS, by C. T. Tomizuka and Richard A. Roberts. Technical rept. on Contract AF 49(638)790. [1961] 7p. 4 refs. AFOSR-2808.

DESCRIPTORS: *Crystals, *Silver, *Zinc, *Diffusion, Energy, Labeled substances, Elasticity, Relaxation time, Metallic crystals.

If the mechanisms for diffusion is the same in the tracer and the anelastic processes, then the activation energies found by the two methods should be identical. The present work is an attempt to enhance current understanding of this particular problem by the experimental comparison of these activation energies.

PB 159 382 $2.60

Laboratory for Insulation Research., Mass. Inst. of Tech., Cambridge.
CRYSTAL PHYSICS. Final summary rept. 15 Nov 59-1 Jan 61, on Contract Noar-1841(50). Feb 61, 28p. 28 refs. Technical rept. 159; AD-252 664.

DESCRIPTORS: *Crystals, Single crystals, Growth, Purification, Physical properties, Crystal structure, Lattices.

In the broad field of crystal physics, three main problems are under study, (1) preparation and purification of starting materials for crystal growth, (2) study of crystal growth and practical crystal growing, (3) investigation of intrinsic and structure-sensitive properties of single crystals. Processes of crystal growth from solution and melt and by flame fusion were studied. A variety of organic, inorganic, and metal crystals were grown for the study of their properties and special effects. Imperfections of crystals were studied by means of high-precision lattice-constant determination, weighing density, thermal etching, ionic conductivity, and optical absorption. A great part of the work was devoted to a study of electron and hole traps in pure and doped crystals by means of color centers.

AD-278 039 $3.60

Shockley Transistor [Corp.] Palo Alto, Calif.
FAILURE MECHANISMS IN SILICON SEMICONDUCTORS, by Hans J. Queisser. Quarterly status rept. no. 3, 1 Jan-31 Mar 62, on Contract AF 30(602)2556. RADC-TDR-62-155.

DESCRIPTORS: *Semiconductors, *Silicon, *Diodes, Crystal structure, Oxygen, Failure (Mechanics), Reliability, Chemical impurities, Conductivity, Diffusion, Electroplating solutions, Electroplating, Electrical properties, Surfaces, Measurement, Solid state physics, Deformation.

Studies at small angle grain boundaries in silicon are continued. Conductivity data of diffusion spikes at the boundaries are reported. Measurements of the photo-emf at grain boundaries strongly suggest the presence of oxygen atmospheres around the dislocations. Bicrystals with low oxygen content were grown with the Dash-method. They show no photoresponse. Electrochemical staining can give p-n delineations which do not depend upon the diffusion profiles but rather upon the as-grown boundary. These results agree with the photoresponse data and show that the grain boundary acts as a junction with polarity depending upon thermal history. Stacking fault studies in epitaxial silicon are continued; oxygen impurities on the substrate surface are important nucleation centers for faulty growth. (Author)
(See also AD 272 624)

PB 162 409 $4.60

St. Louis U., Mo.
THEORETICAL STUDY OF PROBLEMS CONNECTED WITH THE SOLID STATE RASER, by Robert Neusel and Mohan Lal Narchal. Technical rept. on Contract AF 49(638)612. 1 Nov 61, 47p. 3 refs. AFOSR TR 1794; NASA N62-10547.

DESCRIPTORS: *Solid state physics, Theory, *Microwave amplifiers, Amplifiers, *Quantum mechanics, Nuclear spins, Nuclear resonance, *Probability, *Perturbation theory, Tensor analysis, Paramagnetic resonance, Relaxation time, Radio signals, Detection, Quantum statistics.

Contents:
Eigenvalues and Induced Transition Probabilities for an Anisotropic Spin Hamiltonian
Effect of Finite Probability Associated with the detection field on the enhancement of a RASER.

NYO-9863 $1.60

Technical Research Group, Syosset, N.Y.
SYNTHESIS OF SEMICONDUCTOR MATERIALS BY RADIATION INDUCED REACTIONS, by Kalman Held and Richard J. Goldman. Quarterly status rept. no. 11, 1 Nov 61-31 Jan 62, on Contract AT(30-1)-2392. 11p. TRG-132-QTR-11.

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

NASA N62-16363 $10.50

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
RESEARCH SUMMARY NO. 36-12, VOLUME I. Rept. for 1 Oct-1 Dec 61 on Contract NAS7-100. 2 Jan 62, 140p. 129 refs.

PB 159 381 $1.60

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
A CENTER FOR MATERIALS SCIENCE AND TECHNOLOGY, by A. von Hippel. Rept. on Contract Nonr-1841(10). Feb 61, 12p. Technical rept. 158; AD-251 032.

DESCRIPTORS: *Scientific research, Materials, *Scientific organizations, Operations research, *Research program administration.

This report discusses interdepartmental research center functions and their applications for materials science and technology. The Mayo Clinic as an organization of cooperating scientific specialists is used as an analogy. The problems of the Center for Materials Science and Technology are more complex (reflect a wider scope of subjects) and, thus the suggested organization, administration and coordination of such an undertaking, will be somewhat complicated.

TID-14725 $2.75

Lawrence Radiation Lab., U. of California, Berkeley.
STATUS: FISCAL YEARS 1960 AND 1961. Rept. on Contract W-7405-eng-48. June 61, 92p. UCRL-Pub-34. Prepared in cooperation with Lawrence Radiation Lab., U. of California, Livermore.

AD-280 199 $3.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
FLOW GRAPH TECHNIQUES FOR RELIABILITY ENGINEERING, by J. L. Burroughs and W. W. Happ. Rept. on Systems Analysis. Mar 62, 35p. 111 refs. Rept. no. LMSC 3-38-62-1.

DESCRIPTORS: *Electronic equipment, *Reliability (Electronics), *Statistical analysis, Probability, Errors, Signals, Circuits, Programming, Bibliography.

Essentials of flow graph techniques are concisely summarized emphasizing those aspects directly useful in reliability analysis. Illustrative examples of applying flow graphs to reliability problems include: (1) Reliability of systems with many types of variables. (2) Error propagation in systems with interacting variables. (3) Optimization of multistage decision processes. A survey of over 100 cited references pertinent to the application of flow graphs to reliability engineering leads to the conclusion that a large number of reliability problems can be reduced to a few basic patterns. Flow graphs clearly reveal these patterns, thereby providing a systematic approach to solve a wide range of problems by reverting to existing patterns, if possible, or by adapting or combining known solutions. (Author)

SOCIAL SCIENCES

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AC 1.11/2:961

Arms Control and Disarmament Agency, Washington, D. C.
DOCUMENTS ON DISARMAMENT, 1961. Aug 62, 814p. Publication no. 5.

DESCRIPTORS: *Documentation, *Weapons, Control, Reports, Conferences, Bibliography, *Political science.

This volume contains basic documents regarding international negotiations on disarmament and related matters. Some material on relevant major political issues is included to show the wider context within which disarmament developments took place. Key papers on the establishment of the United States Arms Control and Disarmament Agency are also printed. The documents are arranged in chronological order, and the following reference aids are included: (1) a table of contents, (2) a list of abbreviations, (3) a list of international organizations and conferences, (4) a bibliography, (5) a list of persons, (6) a topical list of documents, (7) an index.

PB 158 331 $4.60

Itek Labs., Lexington, Mass.
COMPILATION OF AN EXPERIMENTAL CITATION INDEX FROM SCIENTIFIC LITERATURE, by Ben-Ami Lipetz. Technical rept. on Contract NSF-C88. June 61, 46p. 20 refs. Rept. no. IL 4000-19.

DESCRIPTORS: *Indexes, Preparation, Punched card methods, *Scientific reports, Documentation.

This report, expanded from an earlier version, presents the methods which were employed and the problems which were encountered in creating a citation index from the standard body of literature with the aid of IBM punched card equipment. Experimental evaluation of the usefulness of the citation index is in too early a stage to warrant reporting here, but some basic information is given on the content of the index.

AD-280 179 $4.60

Rand Corp., Santa Monica, Calif.
A SELECTED LIST OF UNCLASSIFIED PUBLICATIONS OF THE SOCIAL SCIENCE DEPARTMENT, THE RAND CORPORATION 1948-1962. Apr 62, 50p. 239 refs. Memorandum RM-1403-9.

DESCRIPTORS: *Bibliography, *Social sciences, Literature.

MISCELLANEOUS

PB 181 079 $1.25, $10.00/year

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS. Dec 62.

DESCRIPTORS: *Naval research, *Scientific research, Ice, Adhesion, Fracture (Mechanics), Atmosphere, Astrophysics, Fission product activity, Chemistry, Platinum, Oxygen, Electrodes, Metallurgy, Ceramic materials, Fatigue (Mechanics), Rupture, Metals, Phosphates, Solutions, Temperature, Mercury, Urine, Tin alloys, Aluminum alloys, Coatings, Oxidation, Iron alloys, Manganese alloys, Water vapor, High temperature research, Optics, Lasers, Ruby, Radio, Radiosondes, Telemetering, Radio transmitters, Range finding, Radio waves, Reflections, Moon, Errors, Satellite vehicles, Tracking, Vacuum apparatus, Propagation, Solid state physics, Color centers, Halides, Alkali metals, Electron bombardment, Lithium compounds, Fluorides, Luminescence, Sound, Water tanks, Acoustics, Analysis, Underwater sound, Transducers, Scientific reports, Patents.

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Solid State Physics: Transient color centers produced in alkali halide crystals by pulsed electron bombardment. Simplified processes for preparing high quality thermoluminescent LiF

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